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Study of Effects on Haematological Parameters in Neonates Receiving Phototherapy for Neonatal Hyperbilirubinaemia

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haematological parameters, neonates receiving phototherapy, neonatal hyperbilirubinaemia

ABSTRACT:
Introduction: Phototherapy though safe, is not free of side effects, the following adverse effects and complications have been noted: increase insensible water loss, loose stools, retinal damage, bronze baby syndrome, gonadal toxicity, impaired maternal infant interaction, hypocalcaemia and skin rash. The combination of hyperbilirubinemia and phototherapy can produce DNA strand breakage and other effects on cellular genetic material. Although most of the studies have documented thrombocytopenia as a result of phototherapy but, few other studies have proven the opposite effect of phototherapy on the platelet count. Objective: To study effect of phototherapy on hematological parameters in neonates. Materials and methods: The present descriptive observational study was carried out at department of Paediatrics, MIMSR Medical College and YCRH Latur, Maharashtra during the study period from January to December 2021. Results:We included total 44 term neonates receiving phototherapy in our study. Out of 44, majority i.e. 27(61.4%) were from 6-10 days and 17(38.6%) were from 1-5 days age group.52.3% were females and 47.7% were male neonates. Incidence of anemia after phototherapy in our study was 20.5%. Incidence of thrombocytopenia after phototherapy in our study was 36.4%. Incidence of leucocytosis after phototherapy in our study was 25%. Incidence of reticulocytosis after phototherapy in our study was 18.2%. Incidence of Raised Hematocrit after phototherapy in our study was 27.3%.Conclusion: Incidence of anemia after phototherapy in our study was 20.5%, incidence of thrombocytopenia was 36.4%, incidence of leucocytosis was 25%, incidence of reticulocytosis was 18.2% and incidence of Raised Hematocrit was 27.3%.

Introduction

Neonatal jaundice due to unconjugated hyperbilirubinaemia is a quite common condition that affects about 60% of term and 80% of preterm infants during first week of life.[1] Once unconjugated hyperbilirubinemia crosses the upper limits of physiological jaundice, it may be harmful for the brain resulting in permanent developmental delay. [2] Treatment options available for unconjugated hyperbilirubinemia include phototherapy, exchange transfusion and IVIG. Out of these options, phototherapy which is a non-invasive technique has been used widely for the treatment of neonatal jaundice. Generally, phototherapy is very safe and may have no serious long-term effects on neonates. [3]

Phototherapy though safe, is not free of side effects, the following adverse effects and complications have been noted: increase insensible water loss, loose stools, retinal damage, bronze baby syndrome, gonadal toxicity, impaired maternalinfant interaction, hypocalcaemia and skin rash. The combination of hyperbilirubinemia and phototherapy can produce DNAstrand breakage and other effects on cellular genetic material. [4] Although most of the studies have documented thrombocytopenia as a result of phototherapy but, few other studies have proven the opposite effect of phototherapy on the platelet count. So, the ultimate effect ofphototherapy on platelet count still needs to be investigated further in various clinical settings.[5]

Objective: To study effect of phototherapy on hematological parameters in neonates.

Materials and Methods

Type of study – Observational comparative study

Type of sampling - Random sampling method

Study setting: MIMSR Medical College and YCRH Latur, Maharashtra

Duration of study – January to December 2021

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Study groups –Term & normal weighted neonates having hyperbilirubinemia

Inclusion Criteria

- Term neonates
- Normal weight neonate who receiving phototherapy

Exclusion Criteria

- Neonates with Conjugated Hyperbilirubinemia
- Birth asphyxia
- Septicaemia
- Renal failure

Methods of data collection

Informed & written consent was obtained. On clinical examination, (by applying Kramers's Rule) term & normal weighted neonates were selected. Blood samples of selected neonates were sent to laboratory for measurement of serum bilirubin (total & direct). Neonates having exaggerated serum bilirubin level were admitted in NICU for phototherapy. Before starting phototherapy, blood sample was collected for haematological parameters. Duration of phototherapy was measured and recorded.

After stopping phototherapy haematological parameters were recorded. Data of haematological parameters before & after phototherapy were recorded, studied comparatively & statistical analysis was done. Serum bilirubin was the admission criteria.

Haematological parameters – Haemoglobin, Total leucocyte count, ESR, Haematocrit, Reticulocyte count, Platelet count.

Total and direct bilirubin were measured by Diazo method. (Diazotized sulfanilic test). Principle - Bilirubin reacts with diazotized sulfanilic acid to produce azobilirubin which is quantified by spectrometry. Both direct and indirect bilirubin couple with diazo in the presence of cetrimide. The terms 'direct' and 'indirect' are equivalent to conjugated and unconjugated fractions. Haematological parameters measured by auto analyser.

Statistical analysis and methods-

Data was collected by using a structure proforma. Data thus was entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of percentages and proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/ Fischer's exact test. Comparison of mean and SD between two groups will be done by using unpaired t test to assess whether the mean difference between groups is significant or not. Descriptive statistics of each variable was presented in terms of Mean, standard deviation, standard error of mean. A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

Results

Table 1: Distribution according to age group

		Frequency	Percent
Age group in days	1 to 5	17	38.6
	6 to 10	27	61.4
	Total	44	100.0

We included total 44 term neonates receiving phototherapy in our study. Out of 44, majority i.e. 27(61.4%) were from 6-10 days and 17(38.6%) were from 1-5 days age group.

Table 2: Distribution according to gender

		Frequency	Percent
Gender	Male	21	47.7

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	Female	23	52.3
	Total	44	100.0

52.3% were females and 47.7% were male neonates

Table 3: Incidence of anemia, Thrombocytopenia, Leucocytosis, Reticulocytosis and Raised Hematocrit

		Frequency	Percent
Anaemia	Present	9	20.5
	Absent	35	79.5
	Total	44	100
Thrombocytopenia	Present	16	36.4
	Absent	28	63.6
	Total	44	100
Leucocytosis	Present	11	25
	Absent	33	75
	Total	44	100
Reticulocytosis	Present	8	18.2
	Absent	36	81.8
	Total	44	100
Raised Hematocrit	Present	12	27.3
	Absent	32	72.7
	Total	44	100

Incidence of anemia after phototherapy in our study was 20.5%. Incidence of thrombocytopenia after phototherapy in our study was 36.4%. Incidence of leucocytosis after phototherapy in our study was 25%. Incidence of reticulocytosis after phototherapy in our study was 18.2%. Incidence of Raised Hematocrit after phototherapy in our study was 27.3%.

Discussion

Demographic information

We included total 44 term neonates receiving phototherapy in our study. Out of 44, majority i.e. 27(61.4%) were from 6-10 days and 17(38.6%) were from 1-5 days age group. 52.3% were females and 47.7% were male neonates. 25(56.8%) neonates were born to mothers with normal vaginal delivery and 19(43.2%) were born with LSCS. Mean Age of newborn (days) was 6.09±1.38.

Amar Shah DC et al[6] in their study reported that the mean age of the neonates was 2.97 days with standard deviation of 1.2 days. 37(58.7%) were male while 26(41.3%) were females. Percentage of Pre-term babies was 30.1. Neonates having low birth weight were 17(26.9%).**Altuntas N et al**[7] in their study reported that mean age of the neonates at admission was 6.05 ±3.7 days. Male child were 45 (61.81%) and Female were 29 (39.18%). **Prashant Shah et al**[8] included 100 neonates that were managed with phototherapy. Male: Female ratio was 1:1.22. Incidence of low-birth-weight babies was 26% and preterm was 19%. Mean birth weight and gestational age was 2.82±0.3 kg and 38.4±1.5weeks respectively.**Sarkar SK et al**[9]included 190 neonates in their study. Among them 108(56.8%) neonates were male and 82(43.2%) were female; 90(47.4%) neonates were preterm and 100(52.6%) were term. One hundred and thirty-nine (73.2%) neonates were delivered by vaginal delivery (VD) and 51(26.8%) neonates were delivered by lower uterine caesarean section (LUCS).

Thrombocytopenia- Incidence of thrombocytopenia after phototherapy in our study was 36.4%.

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Abd El Moktader AM et al[10] reported the incidence of thrombocytopenia after phototherapy in our study was 7.5% which is very less as compared to our study findings. **Pishva N et al**[11] observed that thrombocytopenia during phototherapy in 49% of his hyperbilirubinaemic neonates was maximum after the first 24 hours of exposure. **Hassan Boskabadi et al**[12] found that 60% of babies had decreased platelets count after phototherapy.

Conclusion

Incidence of anemia after phototherapy in our study was 20.5%, incidence of thrombocytopenia was 36.4%, incidence of leucocytosis was 25%, incidence of reticulocytosis was 18.2% and incidence of Raised Hematocrit was 27.3%.

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