Original Article

Management of Neonatal Jaundice

Comparison of Continuous with Intermittent Phototherapy Technique for the Management of Neonatal Jaundice

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ABSTRACT

Objective: To compare the two phototherapy techniques; continuous and intermittent for the treatment of neonatal jaundice.

Study Design: Randomized control trial study.

Place and Duration of Study: This study was conducted at the department of Paediatric Medicine, Nishtar hospital, Multan from October 2016 to March 2017.

Materials and Methods: This randomized control trial was conducted in the department of Paediatric Medicine, Nishtar hospital, Multan. Duration of study was six months from October 2016 to March 2017. Data was entered in statistical computer software SPSS v 23.1 and analyzed for desired variable analysis. Mean and SD was calculated for numerical data like age, Baseline bilirubin and follow up bilirubin, similarly frequency percentages were calculated categorical data like gender . Chi square test was applied for effect modification or association of outcome variables with effect modifiers. P value < 0.05 was considered as significant.

Results: A total number of 100% (n=300) babies were included in this study, both genders. Gender distribution showed there were 65.3% (n=196) males and 34.7% (n=104) females babies (p=0.849). The mean baseline bilirubin of the babies was 17.80±1.35mg/dl, while the mean follow-up bilirubin was 17.66±1.14 mg/dl. The mean difference between the baseline bilirubin and the follow-up bilirubin was 0.138±1.63 mg/dl i.e. no significant difference was found (p=0.298).

Conclusion: Both techniques of phototherapy intermittent and continuous phototherapies are equally effective in management of neonatal indirect bilirubin, but intermittent phototherapy have some additional benefits. So intermittent phototherapy technique can be used as routine treatment technique.

Key Words: Neonatal Jaundice, Phototherapy, Continuous, Intermittent.

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INTRODUCTION

Jaundice is a discoloration of sclera, skin and mucus membrane of cleft palate dye to access of bilirubin[1]. This condition requires special care and attention in new born babies, approximately incidence 60% in term infants and 80% in preterm[2]. In neonates hyper-bilirubinemia named as jaundice neonatorum and its incidence is 39.7/1000 live births. There are two types of bilirubinemia; conjugated and unconjugated[3].

Unconjugated bilirubin is the result of catabolism of heme protein and may be harmful if raised to significance level. It's treatment should be aimed to protect neurotoxicity due to unconjugated bilirubin[4].

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Neonatal jaundice commonly treated with phototherapy which converts the bilirubin into less toxic polar stereoisomer (unable to cross blood brain barrier and then eliminated through urine or bile. Efficacy of phototherapy depends upon the wavelength and intensity of light, surface area and distance from skin[5].

Procedure of phototherapy is rapid found to be significant at 42 and 15 E isomers for the period of 15 minutes. Method of its application are intermittent and continues[6,7]. In a previous study it was reported that both methods are equally effective mean serum bilirubin was 9.17+1.83 mg/dl at thirty six hours in continuous and 9.02+1.94 in intermittent group respectively. Mean decrease after phototherapy was 7.43+0.07 and 7.31+0.48 mg/dl in continuous and intermittent groups respectively[5]. In many method is easy, convenient better for neonatal feeding and also easy for hospital staff[8].

Phototherapy technique may be used as prophylaxis or definite treatment in management of jaundice[9]. Other than continuous and intermittent methods two more mechanisms are available in market; photo-isomerization and photooxidation in cases of hiperbilirubin[10]. When these mechanisms compared at was noted that photo-catabolism is more effective and

oxidation mechanism have very minor role for the treatment of indirect/ unconjugated bilirubin in cases of infants[11].

There was no definite study has been conducted in Pakistan and this study will provide the base line data for our setup.

MATERIALS AND METHODS

This randomized control trial was conducted in the department of pediatric medicine Nishtar hospital, Multan. Duration of study was six months from October 2016 to March 2017. Study was started after ethical approval from ethical board of institution and informed consent was obtained from patients or their attendants after complete information. Non probability consecutive sampling technique was used and sample size of 300 patients was calculated from online statistical calculator by using following statistics; CI 95%, Power of study 80% and P1 mean change in bilirubin at 36 weeks in continuous group 12.86 ± 1.532 and P2 mean change in bilirubin at 36 weeks in intermittent group 12.84 ± 1.76. We divide 300 patients into two equal groups (group A and group B) 150 patients in each group. Name of all patients were written on paper slips and each slip was coded was coded with numbers (1-300). A blind person was asked to choose a slip from the box. Firs slips (even or odd) was included in group A and remaining all patients were divided on the basis of that first slip (even or odd). In group A patients treated with continuous phototherapy for twenty minutes off and two hours on and in B patients were treated with intermittent phototherapy one hour on and 30 minutes off. Phototherapy was done by an experienced consultant having experience more than 5 years and was blind from the study procedure.

Serum indirect/unconjugated bilirubin more than 12 mg/dl in neonates on laboratory investigation was considered as neonatal jaundice. On or off application of phototherapy was labeled as intermittent method of phototherapy. Full term babies of age 24 hours 10 days, bilirubin unconjugated 12-20 mg/dl, Apgar score more than 6 at five minutes were included. Patients with ventilator support, peritoneal dialysis and any congenital abnormality were excluded. Phototherapy in both groups was given with same machine with same light distance.

Blood sample for serum bilirubin were drawn and sent to laboratory for investigation of baseline indirect bilirubin before start of procedure phototherapy and after 36 hours for follow ups. All information was recorded on predesigned performa. Time of on and off phototherapy was noted (one hour on after every 30 min off).

Data was entered in statistical computer software SPSS v 23.1 and analyzed for desired variable analysis. Mean and SD was calculated for numerical data like age, Baseline bilirubin and follow up bilirubin, similarly frequency percentages were calculated categorical data like gender . Chi square test was applied for effect modification or association of outcome variables with effect modifiers. P value < 0.05 was considered as significant.

RESULTS

A total number of 100% (n=300) babies were included in this study, both genders. Gender distribution showed there were 65.3% (n=196) males and 34.7% (n=104) females babies (p=0.849). The mean age of the babies was 3.98±1.30 days (p=0.729). The mean baseline bilirubin of the babies was 17.79±1.22mg/dl, while the mean follow-up bilirubin was 17.72±1.13 mg/dl. The mean difference between the baseline bilirubin and the follow-up bilirubin was 0.065±1.73 mg/dl i.e. no significant difference was found (p=0.517). (Table. 1).

The group A 100% (n=150), treated with continuous phototherapy, the mean age of the babies was 4.03±1.25 days (p=0.334). There were 62.7% (n=94) males and 37.3% (n=56) females (p=0.849). The mean baseline bilirubin of the babies was 17.78±1.22 mg/dl, while the mean follow-up bilirubin was 17.79±1.13 mg/dl. The mean difference between the baseline bilirubin and the follow-up bilirubin was -0.00867±1.83 mg/dl i.e. there was no significant difference (p=0.954). (Table. 2).

Table No. 1: Demographics (n=300)

Characte-ristics	Frequency	Percentage (%)	Test of Sig.
Gender			t=-0.19 p=0.849
Male	196	65.3	
Female	104	34.7	
Total	300	100.0	
Variable	Mean±S.D		
Age	3.98±1.30 days		t=-0.346 p=0.729

Table No. 2: Group wise distribution of gender, baseline Bilirubin and Follow up Bilirubin

Variable	Group A (n=150)	Test of Sig.	Group B (n=150)	Test of Sig.
Gender	M=62.7% F=37.3%	t=-0.190 p=0.849	M=68%, F=32%	t=-0.190 p=0.849
Age	4.03±1.25 days	t=0.967 p=0.334	3.94±1.35 days	t=0.967 p=0.334
Baseline Bilirubin	17.78± 1.22mg/dl	t=-0.058 p=0.954	17.80±1.35mg/dl	t=1.044 p=0.298
Follow-up Bilirubin	17.79±1.13 mg/dl		17.66±1.14 mg/dl	

The group B 100% (n=150), treated with intermittent phototherapy, the mean age of the babies was 3.94±1.35 days (p=0.334). There were 68% (n=102) males and 32% (n=48) females (p=0.849). The mean

baseline bilirubin of the babies was 17.80±1.35mg/dl, while the mean follow-up bilirubin was 17.66±1.14 mg/dl. The mean difference between the baseline bilirubin and the follow-up bilirubin was 0.138±1.63 mg/dl i.e. no significant difference was found (p=0.298). (Table. 2).

DISCUSSION

This study was conducted on comparison of two types of phototherapy; a technique to managed neonatal jaundice. It has two types continuous and intermittent; in continuous method phototherapy was done in continuous manner and in intermitant method and on and off procedure was done. By this technique and strong bonding among mother and child has been made without any expenses[12]. In our study there was no significance difference in both groups with respect to gender, similarly decrease in mean bilirubin was also not significant. Niknafs et al[5] also reported same results in his study when gender and efficacy (decrease in mean value of serum bilirubin) of phototherapy in both groups.

In our study we applied phototherapy for twenty minutes off and two hours on in A group and 1 hour on and 30 minutes off in B group, in a study Khaliq A[13] used same timing in both groups but Niknafs et al[5] used for much shorter time period. In our study mean baseline serum bilirubin was 17.78±1.22mg/dl in group A and 17.80±1.35mg/dl in group B and after phototherapy it was 17.79±1.13 mg/dl and 17.66±1.14 mg/dl in group A and B respectively. While, in their study it was observed 16.60mg/dl±1.67 for continuous and 16.33mg/dl±1.46 for intermittent group at baseline and 9.17mg/dl±1.83 for continuous and 9.02±1.94 for intermittent group after thirty six hours. Our results show much lesser decrease in serum bilirubin as compared to their study.

In a study Sachdeva M[14] reported that intermitant phototherapy for twelve hours on and twelve hours of is more effective as compared to continuous technique when used in term neonates with hyperbilirubinemia. Results of his study were also comparable with our results. Kareem MA[15] conducted a similar study in 2011 and reported that intermitant phototherapy for twelve hours on and twelve hours of is more effective as compared to continuous technique if cause if non hemolytic.

In a study Lau and Fung et al reported that there was a significant difference in both techniques when intermitant was used given in schedule of one in four hours[16]. In other studies, Maurer and Vogl reported that intermittent phototherapy did not cause longer phototherapy duration and its repetition[17,18].

In few studies it was also reported that without controlling serum bilirubin with intermitant technique continuous technique is not needful. They found that during feeding period phototherapy should be done and baby must be in hands of mother. During the sessions of phototherapy a strong bonding has been made between baby and mother which is helpful in later sessions and health related problems[19].

CONCLUSION

Both techniques of phototherapy intermittent and continuous phototherapies are equally effective in management of neonatal indirect bilirubin, but intermitant phototherapy have some additional benefits. So intermitant phototherapy technique can be used as routine treatment technique.

Author's Contribution:

Concept & Design of Study:	Muhammad Abubakre Khalid
Drafting:	Muhammad Abubakre Khalid & Ammara Bakhtawar
Data Analysis:	Noor Akbar
Revisiting Critically:	Ammara Bakhtawar
Final Approval of version:	Muhammad Abubakre Khalid

Conflict of Interest: The study has no conflict of interest to declare by any author.

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