

A Study to Assess the Efficacy of Phototherapy for Neonatal Jaundice with and Without the Use of Low-Cost White Reflecting Curtain at Selected Hospitals of Indore

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Abstract: A quasi experimental approach was adopted in this study using two group non equivalent control group design. The population of the study consisted of 40 neonates with hyperbilirubinemia and no other complications admitted in Choithram Hospital and Research Centre, Mission Hospital, Dolphin Hospital, Lifeline Hospital and Gokuldas Hospital assigned to experimental and control group 20 each. The study was intended to assess the effectiveness of phototherapy in reducing serum bilirubin level with the use of white reflecting curtains hanged on the sides of the unit for two days. The investigation was started as soon as the neonates get admitted in NICU for phototherapy with physiologic jaundice. Observation of neonate was done for two days. After introducing the intervention neonate was assessed for other parameters. The key variable was early reduction in serum bilirubin level with a self structured tool. The mean post TSB level in experimental group was 13.7 mg/dl and in control group the mean pre TSB level was 10.89 mg/dl on day 2. The 't' value shows that they are highly statistically significant at $p \leq 0.05$. Mean absolute fall in TSB level in experimental group was 6.01 mg/dl and in control group the mean absolute fall in TSB level was 3.07 mg/dl and 't' (5.22) value showed that there was significant difference in post mean TSB level between experimental and control group.

1. Introduction

Jaundice is a relatively common physical abnormality in a newborn baby during the first week of life. Clinical jaundice manifests as yellowness of the skin of the face when the serum Bilirubin level exceeds 5 mg/dl. Jaundice in term newborn is clinically evident in over 60% of newborn during the first week after birth. Approximately 6-10% of infants have significant hyperbilirubinemia mandating treatment. Multiple phototherapy units are sometimes used to increase the light intensity and thus improve the efficacy of phototherapy. However, light intensity and the area of light-exposed skin can also be increased through the use of reflecting surfaces (eg, white curtains hung from the sides of the phototherapy unit).

2. Need of the Study

In newborn babies with clinically significant hyperbilirubinemia, phototherapy is usually carried out in bassinets. To ensure the efficiency of phototherapy, the trunks of these infants are exposed.

The enormous number of cases of hyperbilirubinemia worldwide can hardly be estimated. In a study of neonatal mortality and morbidity in newborn infants in a tertiary hospital in Llesia Nigeria, 7,225 infants were included for study. The highest rate of indications for hospital admission was neonatal jaundice at 45%. In the study jaundice was listed at the second highest cause of death in the group, at 14%.

In India a study of hyperbilirubinemia and the effect of phototherapy among full term newborns with a view to

develop a nursing care protocol based on identified needs was conducted by Asha P at Manipal, also showed the Incidence of hyperbilirubinemia in a period of six months was found to be 198 per 1000 population, i.e. 20 percentage of the total population were diagnosed as having neonatal hyperbilirubinemia with bilirubin level ≥ 12 mg/dl. All these newborns were treated with Phototherapy.

- The researcher wanted to conduct the study to increase the incidence of early recovery of neonates with hyperbilirubinemia and reduce the infant mortality and morbidity rate in regard with neonatal jaundice.
- The researcher wants to conduct the study to facilitate cost effective quality care for neonates admitted in NICU by potential cost reduction in two ways.
- Firstly, as the shorter duration of treatment means that more patients can be treated with fewer phototherapy units, there will be a cost saving in terms of acquisition and maintenance of phototherapy units. In developing nations, where the number of babies with jaundice may be high, approaches to obtain the maximum possible effect and use from each phototherapy unit seem worthy of study. Thus, if it could be proved that single phototherapy with low-cost reflecting curtains is more effective than single phototherapy alone, it might be a valuable alternative to double phototherapy in the treatment of infants with jaundice.
- Secondly, decreasing the duration of phototherapy should translate into a shorter length of hospitalisation. This would also mean considerably less separation from the mother and less interruption of breast feeding. These advantages would indeed be of major importance in developing nations, but all of the above are also valid for developed countries, where cost effectiveness is becoming increasingly important.

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2.1 Statement of the Problem

“A Quasi experimental study to assess the effectiveness of phototherapy in bilirubin level of newborn babies (gestational age between 35-37 and above) with and without the use of low-cost reflecting curtains in selected hospital of Indore in the year 2010-2011”.

2.2 Objectives

- To assess the bilirubin level before keeping the term neonates under phototherapy in both group A and group B (A-experimental and B-control group).
- To determine the bilirubin level after keeping the term neonates under phototherapy in both group A and group B (A-experimental and B-control group).
- To find out significant difference between effect of phototherapy on bilirubin level of term neonates in both

group A and group B (A-experimental and B-control group).

2.3 Research Hypothesis

H₁- There is significant difference between reduction in bilirubin level with and without low-cost reflecting curtain in newborn babies under phototherapy at the level of p ≤ 0.05.

3. Conceptual Framework

Orlando’s (1972) nursing process discipline is based on the “process by which any individual acts”. The purpose of the process discipline, when it is used between a patient and a nurse is to meet the patient’s immediate need for help. Improvement in the patient’s behaviour that indicates resolution of the need is the desired result.

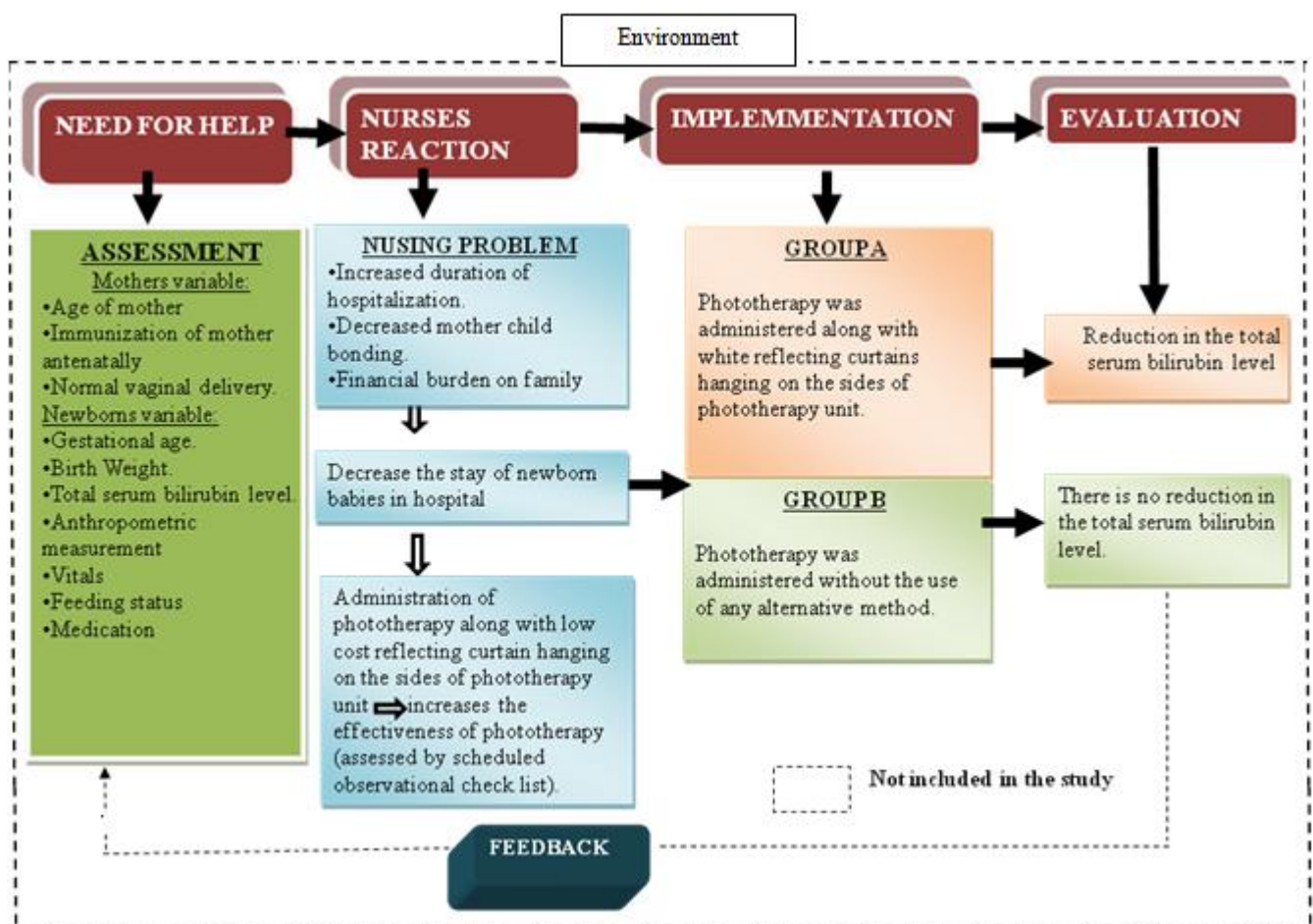


Figure 1

4. Research Methodology

The study adopted non equivalent control group design. The population comprised of 40 Neonates with gestational age more than 35 weeks with bilirubin level ranging between 15 to 20 mg/dl and admitted in NICU for treatment of hyperbilirubinemia and having no other complications like

asphyxia, hypoxia, or any other congenital anomalies admitted in selected hospitals of Indore. A purposive sampling technique was used to select the samples fulfilling the inclusion and exclusion criteria. Non equivalent control group design adopted for the present study is depicted in figure 2.

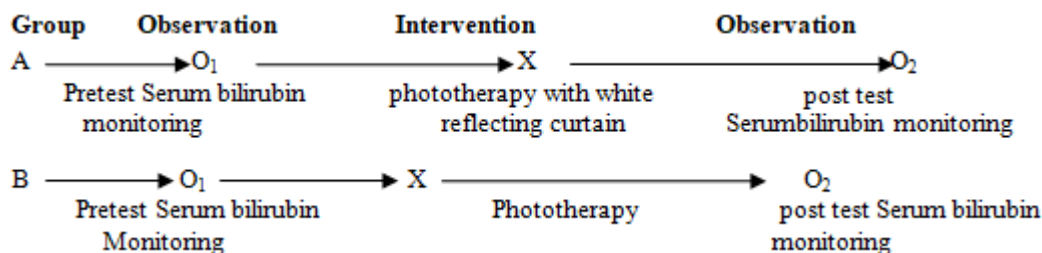


Figure 2: Non –equivalent control group design

Group A – Experimental group

O₁ - Pretest Serum bilirubin monitoring in experimental group

O₃ - Pretest Serum bilirubin monitoring in control group
 X - Phototherapy with white reflecting curtain on the sides of phototherapy unit.

Group B – Control group

O₁ - Pretest Serum bilirubin monitoring in control group
 O₂ -Post test Serum bilirubin monitoring in control group
 X -Phototherapy without the use of alternative method.

Tools used in the study was self structured tool consisting of Socio Demographic variable of mothers, Socio demographic variable of neonate, Neonates observation.

Written permission was obtained from the administrative authorities of the hospital prior to data collection. An informed consent was obtained from each subject and confidentiality was assured to the subjects.

5. Findings

The findings of the two day observations are as follows

Table 1 depicts day 1 mean pre TSB level in experimental group was 16.8 mg/dl and in control group the mean pre TSB level was 16.9 mg/dl. The dispersion of pre TSB level was (SD ± 1.29) and standard error was (.57) and computed ‘t’ (.73) value showed that there was no significant difference in pre mean TSB level between experimental and control group.

	Group	Mean	SD	SE	df	t value
Day 1	Experimental group	16.8	1.29	.57	38	0.73
	Control group on	16.9				NS
Day 2	Experimental group	10.89	2.18	.96	38	9.66
	Control group on	13.7				S

NS – Not significant
 S – Significant

Figure 3 depicts the mean post TSB level in experimental group was 13.7 mg/dl and in control group the mean pre TSB level was 10.89 mg/dl. The dispersion of post TSB level was (SD ± 2.18) and standard error was (.96) and computed ‘t’ (9.66) value showed that there was significant difference in post mean TSB level between experimental and control group.

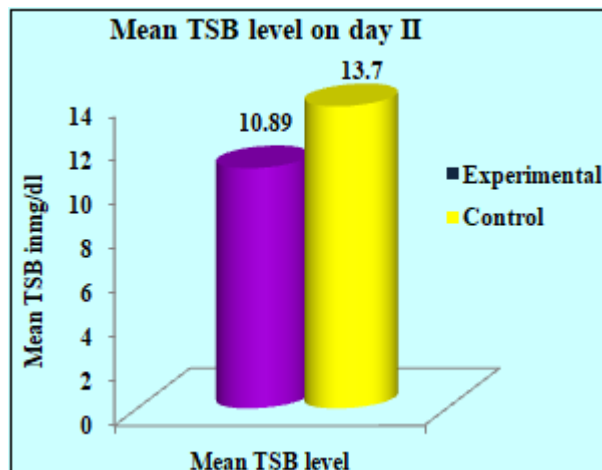


Figure 3: Cylinder diagram showing distribution of mean TSB level

Table 2- Data presented in the table no.5 shows that in day II, mean absolute fall in TSB level in experimental group was 6.01 mg/dl and in control group the mean absolute fall in TSB level was 3.07 mg/dl. The dispersion of mean absolute fall in TSB level was (SD ± 2.04) and standard error was (.89) and computed ‘t’ (5.22) value showed that there was significant difference in post mean TSB level between experimental and control group.

Group	Mean	SD	SE	df	t value
Experimental group	6.01	2.04	.89	38	5.22
Control group	3.07				S

NS – Not significant S – Significant

Table 3- shows that mean time duration of phototherapy in experimental group was 14.9 mg/dl and in control group the mean pre TSB level was 14.75 mg/dl. The dispersion of pre TSB level was (SD ± 1.99) and standard error was (.35) and computed ‘t’ (0.81) value showed that there was no significant difference in mean time duration in TSB level between experimental and control group.

Group	Mean	SD	SE	df	t value
Experimental group	14.9	1.99	.35	38	0.81
Control group	14.75				NS

NS – Not significant S – Significant

6. Discussion & Conclusion

Effectiveness of phototherapy with the use of white reflecting curtain. The mean post TSB level in experimental group was 13.7 mg/dl and in control group the mean pre

TSB level was 10.89 mg/dl. And the computed 't' (9.66) value showed that there was significant difference in post mean TSB level between experimental and control group.

The mean absolute fall in TSB level in experimental group was 6.01 mg/dl and in control group the mean absolute fall in TSB level was 3.07 mg/dl, And computed 't' (5.22) value showed that there was significant difference in post mean TSB level between experimental and control group.

Thus the hypothesis H1 made by researcher was accepted at the level of $p < 0.05$. The researcher came to the conclusion that there was a significant difference in the post mean TSB level of newborn in both the groups.

Above findings are supported by the study which was conducted by S Djokomuljanto .et.al. (2006) to assess the "Efficacy of phototherapy for neonatal jaundice is increased by the use of low-cost white reflecting curtains." at University Sains Malaysia, Kelantan, Malaysia. Randomised controlled clinical trial was made on term newborns with uncomplicated neonatal jaundice presenting in the first week of life. Phototherapy with white curtains hanging from the sides of the phototherapy unit (study group, n = 50) was compared with single phototherapy without curtains (control group, n = 47). Result showed that there was mean (standard deviation) decrease in total serum bilirubin levels after 4 h of phototherapy was significantly ($p < 0.001$) higher in the study group (27.62 (25.24) micromol/l) than in the control group (4.04 (24.27) micromol/l).

7. Conclusion

The study implies that the effectiveness of phototherapy is increased with the use of white reflecting curtain hanged on the sides of phototherapy unit.

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