

# A Quasi-Experimental Study to Assess the Effect of Phototherapy with Aluminum Foil Reflector on Level of Bilirubin among Neonates with Hyperbilirubinemia in Selected Hospital in Panipat, Haryana

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## Abstract

**Background & Objectives:** The study aim to assess the effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with hyperbilirubinemia in selected hospital in Panipat, Haryana. **Materials & Methods:** The methodology of the present study was a Qusi-experimental research design. Sample size of the study was 60 (i.e. 30 each for experimental and control group) neonates selected with convenient sampling technique. Standardized tool (i.e. Kramer scale) with baseline characteristics was used for data collection. Data analysis was done to with the help of descriptive and inferential statistics. **Results:** The study findings reveal with regard to mean of baseline characteristics in experimental group the mean  $\pm$  S.D. of pretest value is 12.97  $\pm$ 1.732. But in post test the mean  $\pm$ S.D. value is 17.30 &1.119. The Df value is 29 and t value is 12.868 and the result is significant. In control group the mean  $\pm$ S.D. of pre-test value is 12.300 & 1.418.but in posttest the mean  $\pm$ S.D. value is 16.43 & 1.654. The Df value is 29 and t value is 14.628 and result is significant. In Kramer scale of experimental group the mean  $\pm$ S.D. of pretest value is 8.83 & 2.086. But in post test the mean  $\pm$ S.D. value is 1.87 & 1.306. The Df value is 29 and t value is 18.094 and the result is significant. In control group the mean  $\pm$ S.D. of pre-test value is 7.867 & 2.030. But in posttest the mean  $\pm$ S.D. value is 1.10 & 0.548. The Df value is 29 and t value is 16.907 and result is significant. Hence, phototherapy with aluminum foil reflector was effective on level of bilirubin among neonates there was statically significant association between pre-test and post test level of knowledge of sample with socio-demographic variables like gender etc. **Conclusion:** The study concluded that the phototherapy with aluminum foil reflector was effective on level of bilirubin among neonates.

**Keywords:** Phototherapy, Aluminum Foil Reflector, Hyperbilirubinemia.

**Introduction:** “Nurses are there when the last breath is taken and nurses are there when the first breath is taken although it is more enjoyable to celebrate the birth it is just as important to comfort in death.” (Christine bell)

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## Background of the Study

Neonatal hyperbilirubinemia (NH) is one of the most common problems in newborns, affecting about 60% of term neonates and 80% of preterm neonates<sup>1</sup>. The word hyperbilirubinemia made by two word i.e. ‘hyper’ means excessive and ‘bilirubinemia’ means bilirubin. Hyperbilirubinemia occurs due to excessive breakdown of red blood cells<sup>2</sup>. It is a yellowish discoloration of the white part of the eye and skin in newborn due to high bilirubinemia levels. It is not a diseases but it is sign and symptoms of a diseases. Neonatal hyperbilirubinemia

can lead to many complications if left untreated<sup>1</sup>.

Bilirubin is formed from breakdown of red blood cells. Red blood cells is broken down into spleen and product is hem that hem product broken down into biliverdin and then into unconjugated bilirubin. Unconjugated bilirubin is more common among neonates. Due to that unconjugated bilirubin baby body is seems yellow in colour. Conjugated bilirubin less common in neonates. Bilirubin has been metabolized but it accumulates in blood usually due to hepatic dysfunction.

Normal level of bilirubin is 0.2-1.2mg/dl when bilirubin level more than 2mg/dl may be visible on the sclera and on the face at about 4-5mg/dl with increasing bilirubin level; hyperbilirubinemia seems to advance in a head-to-foot direction, appearing at the umbilicus at about 15mg/dl and at the feet at about 20mg/dl.

Phototherapy is referred as ‘heliotherapy’<sup>4</sup>. In phototherapy exposure to specific wavelength of light using polychromatic polarized light or fluorescent light. The aluminum foil doesn’t absorb florescent light but it reflect the phototherapy light that light will decreases the level of the hyperbilirubinemia level from the body of baby that bilirubin level will excrete through urine and stool. The single phototherapy with low cost reflecting curtains is more effective than single phototherapy alone. It might be valuable attractive to double phototherapy in the treatment of newborns with hyperbilirubinemia.

**Objective of the study**

1. To assess the effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia in experimental group and control group.
2. To compare the effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia in experimental group and control group.
3. To find out the association of effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia in experimental group and control group with selected

demographic variables.

**Hypothesis**

All hypotheses will be tested at  $p < 0.05$  level of significance:

v H<sub>1</sub>- There will be significant effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia in experimental group and control group.

v H<sub>2</sub>- There will be significant association between effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia with socio-demographic variables

**Research methodology:**

The methodology of the present study was a Quasi-experimental research design. Sample size of the study was 60 (i.e. 30 each for experimental and control group) neonates selected with convenient sampling technique. Standardized tool (i.e. Kramer scale) with baseline characteristics was used for data collection.

**Descriptions of tool:**

Part I: Socio-demographic variables.

Part II: Baseline characteristics.

Part III: Kramer scale.

Kramer scale scoring is:

Scoring	Extent
1	Face and neck only.
2	Chest and back.
3	Abdomen below umbilicus to knees.
4	Arms and legs below knees.
5	Hands and feet.

**Data Analysis**

Data analysis was done to with the help of descriptive and inferential statistics. The collected data are organized, coded and analyzed with the help SPSS

version.

Data analysis and interpretations:

The first objective of the study was to assess the effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia.

With regards to socio-demographic variables to gender experimental group male and female both are equal 15 (50.0%). In control group majority of samples are male 17 (56.7%). Gestational age depicts majority of samples in experimental and control group are term 21 (70.0%) & 23 (76.7%). birth weight in experimental

and control group majority of samples were having 2000-2500 (g) weight 13 (43.3%) & 12 (40.0%). Phototherapy starts (hours) shows majority of samples were in experimental and control were in 72<sup>th</sup> hours 16 (53.3%) & 18 (60.0%). Neonates with current bilirubin level (mg/dl) were majority in experimental and control group in level 10-15 mg/dl 15 (50.0%) & 16 (53.3%). With regards to onset of hyperbilirubinemia majority of samples were onset in 2<sup>nd</sup> -7<sup>th</sup> day of life in experimental and control group 23 (76.7%) & 29 (96.7%).

The second objective of the study is to compare the effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia.

**Table: 1: mean and standard deviation of samples according to pre-test and post test level of baseline characteristics.**

( N = 30 )

		BASE LINE SCORE				Paired T Test		
		Pretest		Posttest		Df	T	Result
Group	N	Mean	SD	Mean	SD			
Experimental Group	30	12.97	1.732	17.30	1.119	29	12.868	S
Control Group	30	12.300	1.418	16.43	1.654	29	14.628	S
Unpaired T Test	Df	58		Df	58			
	T	1.631		T	2.377			
	Result	NS		Result	S			
		Maximum = 1 Minimum = 0						

With regards to pre-test & post test level of baseline characteristics in experimental and control group mean was 12.97 and 12.30 and S.D was 1.732 and 1.418. Kramer scale pre-test and post test score of experimental and control group was mean was 8.83 and 7.867 and S.D is 2.086 and 2.030.

**Table:2: Mean and Standard Deviation  
of samples according to pre-test and post test level of Kramer scale.**

(N=30)

		KRAMER SCALE SCORE				Paired T Test		
		Pretest		Posttest				
Group	N	Mean	SD	Mean	SD	Df	T	Result
Experimental Group	30	8.83	2.086	1.87	1.306	29	18.094	S
Control Group	30	7.867	2.030	1.10	0.548	29	16.907	S
Unpaired T Test	Df	58		Df	58			
	T	1.819		T	2.965			
	Result	NS		Result	S			

The mean score of experimental group and control group of Kramer scale is 8.83 and 7.87. The standard value is 2.09 and 2.03. The post test score of baseline characteristics. The mean score of experimental group and control group is 17.30 and 16.43. The standard value is 1.12 and 1.65.

The third objective of the study to find out the association of effect of phototherapy with aluminum foil reflector on level of bilirubin among neonates with Hyperbilirubinemia in experimental group and control group with selected demographic variables.

The findings that in experimental group of baseline characteristics of pretest & post test levels of birth weight is 4.637(0.010) & 4.201(0.015) has significant association among neonates ( $p < 0.005$ ). The findings that in control group of baseline characteristics of pretest & post test levels of birth weight is 6.490 (0.002) & 5.029 (0.007) has significant association among neonates ( $p < 0.005$ ).

The findings that in experimental group of Kramer scale of pretest & post test levels of Current bilirubin level (mg/dl) is 24.065 (0.000). In post test of Kramer scale in any complication during pregnancy is 2.490(0.019)

has significant association among neonates ( $p < 0.005$ ). The findings that in control group of Kramer scale of pretest & post test levels of Current bilirubin level (mg/dl) is 24.065 (0.00). In post test of Kramer scale in any complication during pregnancy is 2.490(0.019) has significant association among neonates ( $p < 0.005$ )

The findings of experimental and control group in baseline characteristics of pretest and post test socio-demographic variables gender, gestational age, Age of newborn at which phototherapy starts (hours), Current bilirubin level (mg/dl), Neonates age at onset of hyperbilirubinemia (in days), Any complication during pregnancy are non-significant.

The findings of experimental and control group in Kramer scale of pretest socio-demographic variables gender, gestational age, Age of newborn at which phototherapy starts (hours), Neonates age at onset of hyperbilirubinemia (in days), Any complication during pregnancy are non-significant.

The findings of experimental and control group in Kramer scale of posttest socio-demographic variables gender, gestational age, Age of newborn at which phototherapy starts (hours), Current bilirubin level (mg/

dl), Neonates age at onset of hyperbilirubinemia (in days), are non-significant.

Summary, major findings, implication, recommendation:

### Major findings of the study

The major finding of the study was in experimental and control group are as follows:

Ø With regards to socio-demographics variables regards to gender experimental group male and female both are equal 15 (50.0%). In control group majority of samples are male 17 (56.7%). Gestational age depicts majority of samples in experimental and control group are term 21 (70.0%) & 23 (76.7%). According to birth weight in experimental and control group majority of samples were having 2000-2500 (g) weight 13 (43.3%) & 12 (40.0%). Phototherapy starts (hours) shows majority of samples were in experimental and control group were in 72<sup>th</sup> hours 16 (53.3%) & 18 (60.0%). Samples with current bilirubin level (mg/dl) were majority in experimental and control group in level 10-15 mg/dl 15 (50.0%) & 16 (53.3%). With regards to onset of Hyperbilirubinemia majority of samples were onset in 2<sup>nd</sup>-7<sup>th</sup> day of life in experimental and control group 23 (76.7%) & 29 (96.7%). Samples with no complication were majority in experimental and control group 23 (76.7%) & 25 (83.3%).

Ø The mean score of experimental group and control group is 12.97 and 12.30. The standard value is 1.73 and 1.42. The mean difference is 0.667 and unpaired t test value is 1.631. The p value is 0.1082 and table value is 2.00. The result is Non significant. The mean score of experimental group and control group is 8.83 and 7.87. The standard value is 2.09 and 2.03. The mean difference is 0.967 and unpaired t test value is 1.819. The p value is 0.0740 and table value is 2.00. The result is Non significant.

Ø The mean score of experimental group and control group is 1.87 and 1.10. The standard value is 1.31 and 0.55. The mean difference is 0.767 and unpaired t test value is 2.965. The p value is 0.004 and table value is 2.00. The result is significant.

### Implication for nursing practice

1. The pediatric nurses can adopt phototherapy with aluminum foil reflector as simple, cost-effective, physiological nursing measure employed in care of neonates undergoing phototherapy at their clinical areas of practice.

2. The child health nursing practitioners can formulate a separate protocol for practicing phototherapy with aluminum foil reflector in their daily routine as control measure of hyperbilirubinemia.

3. Phototherapy with aluminum foil reflector can be taught and practiced by nurses in hospital care settings as part of their routine care.

### Implications for nursing administrations

1. This research will be successfully implemented in Civil, Rainbow and LHDM & Dr. Prem hospital, Panipat.

2. The Child Health Nurse administrator along with the administrative bodies and other health care agencies can devise a program to focus on the measures to control bilirubin level among neonates.

3. The nurse administrator within the institution should motivate and train the staff to carry out routine assessment of level of bilirubin among neonates undergoing phototherapy with aluminum foil reflector.

4. The nurse administrator can allot separate budget for in-service education to disseminate the research findings to all nurses at various affiliated institutions.

### Recommendations

1. The researcher will recommend the neonatal health care provider to do phototherapy with aluminum foil reflector.

2. The researcher will recommend performing phototherapy with aluminum foil reflector when the neonate is in hyperbilirubinemia & avoid unnecessary manipulation of neonates before the phototherapy in order to reduce the level of bilirubin.

3. The researcher will recommend for implementing the phototherapy with aluminum foil reflector among neonates undergoing phototherapy in the clinical area of Civil, Rainbow and LHDM & Dr. Prem hospital, Panipat.

4. The study can be replicated with large samples in various other settings for reinforcement.

**Conclusion:** The study concluded that the phototherapy with aluminum foil reflector was effective on level of bilirubin among neonates.

**Ethical Clearance:** Obtained

**Source of Funding:** Self

**Conflict of Interest:** Nil

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