

**EFFECTIVENESS OF CONTINUOUS VERSUS
INTERMITTENT PHOTOTHERAPY ON LEVEL
OF BILIRUBIN AMONG BABIES WITH
HYPERBILIRUBINEMIA IN NEONATAL INTENSIVE
CARE UNIT AT GOVERNMENT RAJAJI HOSPITAL,
MADURAI.**

**M.Sc (NURSING) DEGREE EXAMINATION
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MADURAI MEDICAL COLLEGE, MADURAI – 20.**



A dissertation submitted to

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In partial fulfillment of the requirement for the degree of

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OCTOBER 2018

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CERTIFICATE

This is to certify that this dissertation titled, **“EFFECTIVENESS OF CONTINUOUS VERSUS INTERMITTENT PHOTOTHERAPY ON LEVEL OF BILIRUBIN AMONG BABIES WITH HYPERBILIRUBINEMIA IN NEONATAL INTENSIVE CAREUNIT AT GOVERNMENT RAJAJI HOSPITAL, MADURAI,”** is a bonafide work done by **Mrs. BEULA, K.,** M.Sc (N), Student, College of Nursing, Madurai Medical College, Madurai – 20, submitted to **THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY, CHENNAI** in partial fulfillment of the university rules and regulations towards the award of the degree of **MASTER OF SCIENCE IN NURSING, Branch II- Child Health Nursing,** under our guidance and supervision during the academic period from 2016-2018.

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No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude.

- Alfred North Whitehead

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ABSTRACT

Title: Effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at Government Rajaji Hospital, Madurai. **Objectives:** To assess the level of bilirubin among babies with hyperbilirubinemia. To evaluate the effectiveness of continuous phototherapy on level of bilirubin in group I. To evaluate the effectiveness of intermittent phototherapy in group II. To compare the effectiveness between continuous and intermittent phototherapy. To associate the level of bilirubin among babies with hyperbilirubinemia and their demographic variables. **Hypotheses:** There is a significant difference between the pre test and post test level of bilirubin. There is a significant difference between post test level of bilirubin in group I, group II. There is a significant association between their level of bilirubin among babies with hyperbilirubinemia with their demographic and clinical variables. **Methodology:** True experimental pre test post test design was used, 60 subjects selected by simple random sampling and intervention was given for 6 times daily for 6 days. **Results:** The study revealed that group II were had more (19.10%) reduction of level of bilirubin than group I. **Conclusion:** Intermittent phototherapy on hyperbilirubinemia was effective than continuous phototherapy.

Keywords: Hyperbilirubinemia, continuous phototherapy intermittent phototherapy.

TABLE OF CONTENTS

Chapter No	Title	Page No
1	INTRODUCTION	1 – 13
	1.1 Need for the study	6
	1.2 Statement of the problem	11
	1.3 Objectives	11
	1.4 Hypotheses	11
	1.5 Operational definitions	12
	1.6 Assumptions	13
	1.7 Delimitation	13
	1.8 Projected outcome	13
2	REVIEW OF LITERATURE	14 – 28
	2.1 Review of literature related to incidence and prevalence of hyperbilirubinemia among babies	14
	2.2 Review of literature related to the effectiveness of phototherapy	17
	2.3 Review of literature related to effectiveness of continuous versus intermittent phototherapy on hyperbilirubinemia	21
	2.4 Conceptual framework	26
3	RESEARCH METHODOLOGY	29 – 38
	3.1 Research approach	29
	3.2 Research design	30
	3.3 Research variables	30
	3.4 Research setting	31
	3.5 Population	32
	3.6 Sample	32
	3.7 Sampling technique	32

Chapter No	Title	Page No
	3.8 Sampling size	32
	3.9 Criteria for sample selection	32
	3.10 Development and description of tool	33
	3.11 Pilot study	35
	3.12 Procedure for data collection	36
	3.13 Plan for data analysis	36
	3.14 Protection of human rights	37
	3.15 Schematic representation of the study	38
4	DATA ANALYSIS AND INTERPRETATION	39 – 75
5	DISCUSSION	76 – 85
6	SUMMARY AND CONCLUSION	86 – 94
	6.1 Summary	86
	6.2 Major findings of the study	89
	6.3 Conclusion	93
	6.4 Implications of the study	93
	6.5 Recommendations	94
	BIBLIOGRAPHY	95 – 100
	APPENDICES	

LIST OF TABLES

Table No	Title	Page No
1	Frequency and percentage distribution of socio demographic variables among babies with hpoerbilirubinemia	40
2	Frequency and percentage distribution of clinical variables among babies with hpoerbilirubinemia	54
3	Frequency and percentage distribution of pre test level of bilirubin among babies with hpoerbilirubinemia in group i and group ii	60
4.	Pre test and post test level of bilirubin among babies with hyperbilirubinemia in group I.	62
5.	Pre test and post test level of bilirubin among babies in the interventional group II.	63
6	Comparison of mean score of bilirubin among babies with hyperbilirubinemia in group I and group II	64
7.	Effectiveness of continuous (group I) and intermittent phototherapy (group II) among babies with hayperbilirubinemia	66
8.	Association between the post test level of bilirubin among babies with their selected socio demographic variables in group I	68
9	Association between the post test level of bilirubin among babies with their clinical variables in group I	70
10	Association between the post test level of bilirubin among babies with their selected socio demographic variables in group II	72
11	Association between the post test level of bilirubin among babies with hyperbilirubinemia and their clinical variables in group II	74

LIST OF FIGURES

Figure No	Title	Page No
1	Conceptual frame work	28
2	Distribution of babies according to their age	44
3	Distribution of babies according to their sex.	45
4.	Distribution of babies according to their religion.	46
5	Distribution of babies according to their place of domicile	47
6	Distribution of babies according to their father's educational status.	48
7	Distribution of babies according to their mother's educational status	49
8	Distribution of subjects according to their father's occupational status	50
9	Distribution of subjects according to their mother's occupational status	51
10	Distribution of subjects according to their type of family	52
11	Distribution of the subjects according to their monthly family income	53
12	Distribution of subjects according to their passing meconium	57
13	Distribution of subjects according to their hydration status	58
14	Pretest level of bilirubin among babies with hyperbilirubinemia	59
15	Mean score of bilirubin between pre test and post test among babies in group I and group II	61
16	Comparison of mean score of bilirubin in group I and group II.	65
17	Effectiveness of continuous (group i) and intermittent phototherapy (group ii) among babies with hyperbilirubinemia	67

LIST OF APPENDICES

Appendix No	Title
I	Ethical committee approval to conduct the study
II	Content validity certificate
III	Informed consent form
IV	Letter seeking permission to conduct the study
V	Socio demographic and clinical variables - English
VI	Research tool – English
VII	Socio demographic and clinical variables - Tamil
VIII	Certificate for English editing
IX	Certificate for Tamil editing
X	Photographs

INTRODUCTION

CHAPTER I

INTRODUCTION

“The most beautiful necklace a mother can wear is not gold or gems, but her child’s arm around her neck”

-George Herbert

A child is the gift of god or greatest treasure of mankind. Childs health, wellbeing, safety and future are in the hands of parents from birth to death. Birth of a child can be such a happy time, especially when the little one is very healthy. New born can recognize human faces and want the mothers 'familiar face instead of a stranger. The baby also developing their five senses.

New born are considered to be tiny and powerless. Their skin was so smooth without a single purity, and hair was so soft touching like silk threads of all the beautiful things seen on the outside of the child. This New born has so much opportunity after being born in to a world that is full of options. New parents may be filled with much joy and happiness with the arrival of new baby. Birth of a child can be such a happy time, especially when the little one is very healthy. The first year of child life is crucial laying the foundation to good health. At this time certain specific care and precautions are essential to ensure the survival of health of child to a future adult.

Neonates have to face many life threatening problems such as asphyxia, hypothermia,hyperthermia infections and hyperbilirubinemia etc. So the assessment and care of new born is very essential. The most common causes of neonatal deaths are preterm birth complications, new born infections and birth asphyxia. A new born baby who is born pre term or has a potentially life threating problem is an emergency

situation requiring immediate diagnosis and management. Delay in identifications of the problem or in providing the correct management may be fatal.

Pre term or low birth weight infants need special care, including additional attention to breast feeding and breast milk feeding and to keeping them warm at home and in health facilities. Those with preterm birth complications, including respiratory problems need appropriate treatment in hospitals.

Appropriate care during labour and child birth combined with neonatal resuscitation, when needed, can substantially reduce mortality due to birth asphyxia. New born with severe asphyxia need post resuscitation care in hospitals. Early identification of new born infections with prompt and appropriate antibiotic treatment will substantially reduce mortality due to new born sepsis and pneumonia. New born with serious infections need intramuscular or intravenous antibiotics and supportive care in hospitals.

Among these problems of neonates hyperbilirubinemia is the commonest problem among infants in neonatal period. High levels of bilirubin can occur in the blood called hyperbilirubinemia. In most cases, the etiology of this disorder is multifactorial. Several factors must be considered before treatment is begun in icteric new born. First, it is important that the obstetric history of the mother and delivery be analysed to allow identification of the factors that may be contributing to the occurrence of hyperbilirubinemia, such as drugs taken by the mother (diazepam, oxytocin's) type of delivery (forceps, pelvic, caesarean section) delay in umbilical cord clamping, blood type, Rh factor, and maternal coomb's test.

Under normal circumstances, the level of indirect reacting bilirubin in umbilical cord serum is 1-3 mg/dl and rises at the rate of less than 5mg/dl per 24 hrs.

Thus jaundice becomes visible on the 2nd to 3rd day (36-72 hrs) usually peaking by the 3rd day at 5- 6 Mg /dl and decreasing to below 2 mg /dl between 5th and 7th day of life.

The term phototherapy or light therapy literally means, the use of light, especially ultraviolet light, to treat medical conditions. Natural sunlight has been known to be beneficial in certain skin disorders for thousands of years, and it is the ultraviolet part of the radiation produced by the sun that is used in phototherapy.

Indian medical literature dating to 1500 BC describes a treatment combining herbs with natural sunlight to treat non pigmented skin areas. Faroese physician Niels Finsen is believed to be the Father of modern phototherapy. He developed the first artificial light source for this wound healing. Phototherapy is the use of visible light for the treatment of hyperbilirubinemia Neonatal jaundice in the new born.

Phototherapy is the most common form of treatment for jaundice. The bilirubin Level for initiative of phototherapy varies depends on the age and health status of the new born. However any new born with a total serum bilirubin greater than 359umol/l 21mg /dl should receive phototherapy.

Phototherapy consists of the application of fluorescent light to the infants exposed skin light promotes bilirubin excretion by photo isomerization, which alters the structure of bilirubin to a soluble form (Lumirubin) for easier excretion. Studies indicate that blue fluorescent light is more effective in reducing bilirubin. However, because blue light alters the colouration of the infant, the normal light of fluorescent bulbs in the spectrum of 420 to 460 nanometer is often preferred. So that the infants skin can be better observed for colour (jaundice, pallor, and cyanosis).

Phototherapy is safe and effective in neonatal hyperbilirubinemia. Despite its world wide application, specific questions regarding methods of optimizing efficacy remain unanswered Turning the infant is believed to increase the efficacy of

phototherapy and this practice was routinely used in approximately half of neonatal departments in a recent survey some degree of jaundice or hyperbilirubinemia occurs in most New born.

Severe neonatal hyperbilirubinemia is associated with kernicterus, a rare condition characterized by athetoid spasticity, gaze and visual abnormalities, and sensory neural hearing loss in survivors. It may also be associated with mental retardation.

Original article maturity presence or absence of hemolysis, or degree of skin pigmentation phototherapy appears to be safe given the decades of experience with its use in the united states and Europe and the lack of reported serious long term side effects of short term phototherapy. Period phototherapy can be used either as therapy or as prophylaxis. Two different mechanisms have been proposed to explain the action of phototherapy in reducing serum bilirubin concentrations in new born infants, photo isomerization and photo oxidation. Compared with the photo isomerization pathway, the oxidation mechanism appears to play a very minor role in photo catabolism of unconjugated bilirubin in vivo clinical studies comparing intermittent to continuous phototherapy have yielded conflicting results.

Continuous Phototherapy:

A treatment for hyperbilirubinemia and jaundice in the new born that involve the exposure of an infant's bare skin to intense fluorescent light. The blue range of light accelerates the excretion of bilirubin in the skin, decomposing it by photo oxidation.

The infant is placed under the fluorescent lights with the eyes and genitalia covered. The baby was turned frequently and the body temperature was monitored. All vital signs are carefully noted, and details regarding position of the bulbs, time

and duration of treatment, and the baby response are charted continuous photo therapy defined as 2 hours on and 30 minutes off, in reducing total serum bilirubin level in babies. .

A commonly used in the rule of thumb in the NICU is to start phototherapy when the total serum bilirubin level is greater than 5 times the birth weight. Thus in a 1 kg new born, phototherapy is started at a bilirubin level of 5 mg/dl in a 2 kg baby phototherapy is started at a bilirubin level of 10 mg /dl. Babies will require treatment because of the severity of the jaundice, the cause of the jaundice, or how old the baby is when jaundice appears

Intermittent Photo Therapy

Photo isomerization of bilirubin occurs primarily in skin layers and the restoration of the bilirubin pool in the skin takes approximately 1 to 3 hours. Thus a prolonged on- off schedule may not be as effective as continuous therapy but an on – off cycle of less than less than 1 hour is apparently as effective as continuous treatment.

Phototherapy lights should be shut off and eye patches removed during feeding and family visiting for up to one hour, this will not significantly reduce phototherapy effectiveness. Intermittent phototherapy defined as 1 hour on and 1 hour off is as effective as continuous phototherapy in reducing total serum bilirubin level in babies. Bilirubin levels usually decrease by 3 to 4 mg /dl in the first 8 to 12 hours of therapy Thus simple jaundice clears rapidly. Excess bilirubin and jaundice that are the result of haemolytic disease or infection may be controlled with phototherapy, but the underlying cause is treated separately. Recovery is usually complete. The long term safety of phototherapy has not been established.

1.1 Need for the study

The birth of the infant is one of the most awesome inspiring and emotional events that can occur in once life time. The new human being affects the lives of the parents and also other family members. The mother and nurse provide family Centered care for neonates and their parents based on understanding the effect of heredity and environment.

All babies born at Nehru Hospital, Post graduate Institute of Medical education and research, Chandigarh between April 1994 and June 1995 and admitted to the new born unit with a diagnosis of NNJ irrespective of other associated illness were studied. Serum bilirubin was monitored 12 hourly for all babies and after 2 hours and 6 hours following exchange transfusions. A complete haemogram including reticulocyte count, blood grouping for mother and baby, direct coomb's test and Glucose 6 Phospho dehydrogenous disease estimation were done as a part of jaundice work up for all babies. Cockington's charts were used as guidelines for the therapeutic interventions of phototherapy. The initial report from the collaborative study on the effectiveness and safety of phototherapy, under taken under the auspices of the National Institute of Child health and human development, demonstrated that infants receiving phototherapy require significantly fewer exchange transfusions. Further more subsequent follow up studies revealed no adverse out come in the neonates who received phototherapy about 1 out of 2 of term and 8 out of 10 of preterm babies develop jaundice, which generally appears 2 to 4 days after birth, and resolves spontaneously after 7- 14 days, phototherapy has been effectively used as a relatively in expensive and non invasive method of treating neonatal with jaundice was first described by Cremer et al. in 1958. Since that time, phototherapy has been effectively

used as a relatively inexpensive and non invasive method of treating hyperbilirubinemia.

The WHO reveals the source of incidence of hyperbilirubinemia is 50 to 60,000 neonates reported. 2% has total serum bilirubin levels over 20 mg/dl, the total serum bilirubin level in normal range is 0.3 to 1 mg /dl 0.15% had levels over 25 mg/dl and 0.01% has over 30 mg/dl. Thus we can expect 50,000 in 6000 and 400 new born with bilirubin levels of greater than 20 mg/dl. Hyperbilirubinemia is one of the most common problems encountered in new borns.

A prospective study conducted in a neonatal unit in Karachi admitted 414 neonates with jaundice and identified kernicterus in 11.4 % of the neonates (Arif 1982). Neonatal jaundice is recognised as a major problem in other Asian countries. However, large –scale prospective studies documenting incidence of jaundice have not been reported from any part of the world (Newman et al. 1999) Anonymous 2004.

In a multi-center study in six developing countries, hyperbilirubinemia was a primary diagnosis for severe illness hospital admission, the cause for 12-78% of the admission in the first 6 days of life and for 2-57% of admission during the next 7-59 days. While the majority of infants have serum levels of 5-6 mg/dl and will not progress to hyperbilirubinemia, higher levels have been found in exclusively breast-fed infants and in areas of the world where glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is prevalent. This enzyme deficiency coincides with regions with higher child mortality rates, such as Africa and South Asia.

Today, in North America severe hyperbilirubinemia is the most common cause of neonatal readmission Identifying new borns at risk of clinically significant hyperbilirubinemia is important before they are discharged from Hospital. Icter or Jaundice is common event that seen in 60% of term neonate & 80% of preterm ones at

birth, and it is often benign hyperbilirubinemia with a total bilirubin more than 95% percentile on the hour-specific. Bhutani manograms is accompanied with a high risk of bilirubin – induced neurologic dysfunction.

A study reporting rates from hospital-born babies in 10 tertiary care intensive care units in India (27.9%) (NNPD 2004). The minimum detected incidence of pathological hyperbilirubinemia (>15 mg/dl) in our study was 16.5 per 1000 live births. Apr 9,2010. Study participants were 18,985 newborn infants born in Sarlahi District in Southern Nepal from May 2003 through January 2006 who participated in a cluster- randomized, placebo-controlled, community –based trial to evaluate the effect of newborn with photo therapy on neonatal jaundice. Jaundice was assessed based on visual assessment of the infant by a study worker and referral for care. Adjusted relative risks (RR) were estimated to identify risk factors for referral for neonatal jaundice using Poisson regression.

A prospective cohort study was carried out in the Department of Biochemistry, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur for a period of two years,. 150 newborns with jaundice aged up to 28 days, both term and preterm were included in this study. Careful clinical assessment were done to assess the possible etiologies. Serum bilirubin was determined by colorimetric method as described by Jendrassil and Grof. Monitoring of serum bilirubin was done by series measurements once a day in the morning. There is Significant hyperbilirubinemia (TSB>15mg%) was seen in 58 (38.7 %) neonates while 92 (61.3%)

A study was conducted on effectiveness of intermittent versus continuous phototherapy in reduction of level of bilirubin among babies with hyperbilirubinemia at Iran. The study was performed on 114 babies with hyperbilirubinemia. The results

concluded that phototherapy cycle of one hour on and one hour off is as effective as continuous phototherapy in treatment of hyperbilirubinemia.

The study was conducted on “Serum bilirubin kinetics in intermittent phototherapy of physiological jaundice “at Japan with the objectives of to treat the babies in the easiest way to minimize hospital duration. 34 term babies with physiological jaundice were subjected to continuous phototherapy and to two regimens of intermittent phototherapy. The difference in serum bilirubin kinetics between the three groups of treated babies was insignificant; a schedule of one in four hours of irradiation achieved the same treatment effect as continuous phototherapy.

The study was conducted on Regardless of different protocols of phototherapy, the Number-Needed-to-Treat (NNT) for prevention of serum bilirubin level exceeding 20 mg/dL ranged from six to 10 in infants of at least 34 weeks gestation at America. This implies that one needs to treat six to 10 jaundiced neonates with TSB>15 mg/dL by phototherapy in order to prevent the TSB in one infant from rising above 20 mg/dL. Phototherapy combined with cessation of breastfeeding and substitution with formula was the most efficient treatment protocol for infants of at least 34 weeks gestation with jaundice. Eight studies examined the effect of bilirubin reduction on brainstem auditory evoked response (BRER). All consistently showed treatment for neonatal hyperbilirubinemia significantly improved abnormal BAER's in both healthy jaundiced infants and jaundiced infants with hemolytic disease. Three studies evaluated the effect of phototherapy on visual outcomes. All showed no short – or long – term (up to 36 months) effect on vision as a results of phototherapy when infants eyes were properly protected during treatment.

A research was conduted on “bilirubiin included cell death during continuous and intermittent phototherapy and in the dark “at Norway. The researchers compared

continuous and intermittent light exposure in the presence of bilirubin with respect the cellular damage. The results showed that continuous and intermittent light exposure caused the same degree of apoptotic cell death while the cells underwent more necrotic death after intermittent exposure.

A research was conducted at Isrel “ to look for the effect of positiont changing on bilirubin level during the continuous and intermittent phototherapy” They conducted the pilot study in term infants requiring phototherapy in order to determine the time required to clear the skin of bilirubin. Balancing time was 150 minutes. They conducted a randomized study complaining turning the baby in supine position only. They conducted that infants should be nursed supine during phototherapy infants in the supine group showed a significantly larger drop in serum total bilirubin concentration and required shorter duration of phototherapy.

The present study was a prospective hospital based study involving all neonates who were born at ASRAM Medical College and Hospital, a terriary care centre, Eluru West Godavari district, Andhra Pradesh. The present study was conducted from May 2013 to July 2014 over a period of 14 months. A predesigned proforma has aided the enrolment of new born into the study. Significant hyperbilirubinemia was defined as the value of bilirubin according to AAP guidelines in term neonates and Cockington’s charts in preterm, above which phototherapy or exchange transfusion or both are required.

A study was conducted at Meenatchi mission & Research center, Madurai Tamilnadu to determine the incidence of post-phototherapy neonatal plasma total bilirubin rebound a prospective clinical survey was performed on 226 and neonates treated with phototherapy. Neonates were tested for PTB 24 hours after discontinuation of phototherapy a total of 30 neonates developed significant rebound

they conducted that post phototherapy neonates bilirubin rebound to clinically significant levels may occur especially in cases of prematurity.

1.2 Statement of the problem

A study to assess the effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai.

1.3 Objectives

- ❖ To assess the level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai.
- ❖ To evaluate the effectiveness of continuous phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I
- ❖ To evaluate the effectiveness of intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group II.
- ❖ To compare the effectiveness between continuous and intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I and group II.
- ❖ To associate the level of bilirubin among babies with hyperbilirubinemia and their socio demographic and clinical variables.

1.4 Hypotheses

H₁: There is a significant difference between the pre test and post test level of bilirubin among babies with hyperbilirubinemia in group I.

H₂: There is a significant difference between pre test and post test level of bilirubin among babies with hyperbilirubinemia in group II.

H₃: There is a significance difference between post test level of bilirubin among babies with hyperbilirubinemia in group I (continuous phototherapy) and group II (Intermittent phototherapy).

H₄: There is a significant association between the level of bilirubin among babies with hyperbilirubinemia in group I and group II with their selected socio demographic and clinical variables.

1.5 Operational definitions

Effectiveness

It is the outcome of intermittent or continuous photo therapy which will be identified in terms of reduction in level of bilirubin among babies with hyperbilirubinemia and its measured by Adopted Kramer's scale.

Bilirubin

Is a yellow to orange bile pigment produced by the break down of HEME and reduction of Biliverdin it normally circulates in plasma and is taken up by liver cells and conjugated to form bilirubin diglucuronide, the water soluble pigment excreted in the bile.

Intermittent phototherapy

In this study it refers to babies with hyperbilirubinemia is placed in the bassnet of phototherapy machine an one alternative hour for 6 times a day daily in the morning.

Continuous phototherapy

In this study it refers to babies with hyperbilirubinemia is placed in the basenet of phototherapy machine for 2 hours continuously 6 times a day daily in the morning

Hyperbilirubinemia

In this study hyperbilirubinemia refers to babies is having bilirubin level more than 5 mg/dl. Babies with hyperbilirubinemia may prone to develop various complications. Phototherapy helps to reduce the bilirubin level among babies with hyperbilirubinemia.

1.6 Assumption

- ❖ Babies with hyperbilirubinemia may prone to develop various complications
- ❖ Phototherapy helps to reduce the bilirubin level among babies with hyperbilirubinemia

1.7 Delimitation

- ❖ The study is limited to Neonatal intensive care unit at Government Rajaji Hospital Madurai.
- ❖ The study period is limited to 4 to 6 weeks.

1.8 Projected outcomes

The study will help to identify the effect of intermittent phototherapy along with exclusive breast feeding reducing the level of hyperbilirubinemia among male and female babies in neonatal intensive care unit at Government Rajaji Hospital Madurai.

**REVIEW OF
LITERATURE**

CHAPTER - II

REVIEW OF LITERATURE

Nursing research may be considered a continual process in which knowledge gained from earlier studies in integral part of research in general one of the most satisfying aspects of the review is the contribution makes to the knowledge before delivering in to a new knowledge in nursing practice.

This chapter deals with two parts:

Section A : Review of literature related to study

Section B : Conceptual frame work

This chapter attempts to present a review of studies done methodology adopted and conclusion attained by earlier investigators which helps in the study. The sources are internet search, textbook, journal, published and unpublished thesis.

Section A

In this chapter the researcher presents the review of literature under the following headings.

- ❖ **Literature review related to incidence and prevalence of hyperbilirubinemia among babies.**
- ❖ **Literature review related to the effectiveness of photo therapy.**
- ❖ **Literature review related to effectiveness of continuous versus intermittent phototherapy on hyperbilirubinemia.**

2.1 Literature review related to incidence and prevalence of hyperbilirubinemia

Jeanie Adendorff. et. al., (2017) conducted a cross sectional study. The prevalence of neonatal jaundice and risk factors in term neonates at National District Hospital Bloemfontein, South Africa. Total, 96 mother- infant pairs were included,

mothers and infants were conveniently sampled after delivery and before discharge. The mothers were interviewed and their case records were reviewed for risk factors for neonatal jaundice and the clinical. The prevalence of neonatal jaundice was 55.2%; however, only 10% of black babies who were diagnosed with jaundice appeared clinically jaundiced. More than half (55.2%) of healthy term neonates developed neonatal jaundice.

Luke. C. Mullary, Joanne Katz, Khatrysteven. et.al., (2017) was conducted a randomized controlled trial study to identify the Incidence and risk factors for neonatal jaundice among newborns in southern Nepal. Jaundice was assessed based on visual assessment of the infant Male sex, height, birth weight, breast feeding patterns, warm air temperature, primi parity, skilled birth attendance, place of delivery, prolonged labour, oil massage, paternal education and ethnicity were significant risk factors. The incidence of neonatal jaundice was 29.3 per 1000 live births (95% confidence interval: 26.9, 31.7) (P- values < 0.01).

Folorun, Serifat. A.Chukwu, Angela.UI & Tongo. (2015) conducted a retrospective study. This study examined prevalence and associated risk factors affecting neonatal jaundice among neonates born between 2005 and 2010 in University College Hospital, Ibadan. In this study where data were retrieved from neonates' case notes from medical records unit of the University College Hospital, Ibadan. A total of 232 neonatal jaundice cases were analysed and categorized into mild and severe jaundice. Qualitative response regression models was proposed to obtain the precise estimates of the probabilities of a neonatal having neonatal jaundice. In which mode of delivery, place of delivery, Mothers' G6PD Rhesus factor, mother illness during pregnancy, mother level of education, parity of the mother and gestational age were the risk factors. The result showed that gestational age, place of

delivery and Rhesus incompatibility was statistically significant risk factors for neonatal jaundice. Compared to G6PD normal babies 18.8 2.4mg/dl 321.5.41

Siyam Sundar Tikamani. et.al., (2014) conducted a Prospective surveillance study in a multi ethnic population of infants presenting to a primary health centre at Bilal Colony, Karachi, Pakistan. The overall incidence of jaundice, as assessed by CHWs, was 275 cases per 1000 live births (95% CI 250.4–292.8). The rate of jaundice according to physicians using scores on Kramer scale was 116 per 1000 live births (95% CI 101.3–131.9) for score 1–2, 124 (95% CI 108.5–140) for score 3–4 and 17.2 (95% CI 11–23.4) for score 5. Plasma bilirubin could be determined in 125 (26.8%) newborn. Of these, 68 (54.4%) were 0–6 days and 54 (43.2%) 7–28 days old. The overall rate of hyperbilirubinemia (plasma bilirubin level > 5mg/dl) was 39.7 per 1000 live births (95% CI: 29.3–47.6). Rate of plasma bilirubin levels 15–20 mg/dl was 13.0 per 1000 live births (95% CI 7.6–18.4) and 3.5 X 1000 live births (95% CI: 0.4–5.5) for serum levels >20 mg/dl (Table 2). The proportion of infants with a plasma bilirubin measured significantly hygiene young infants assigned a Kramer score 4–5 (P-value 0.00004) than in those receiving scores of 1-3.

Foroughsaki. et.al., (2010) The study was a longitudinal prospective study in 2009-2010. Incidence, Risk Factors and Causes of Severe Neonatal Hyperbilirubinemia in the South of Iran. All infants less than 28 days referred due to severe indirect hyperbilirubinemia were included. Complete history, physical examination and lab work up were performed. Study showed severe neonate indirect hyperbilirubinemia is still prevalence in and ethnic and cultural background of the mother. The logistic regression revealed that the risk of developing a maximum observed TSB ≥ 20 mg / dl was positively associated with lower gestational age, male gender and older maternal age. Also poisson regression revealed that the incidence of

severe hyperbilirubinemia (TSB \geq 20 mg / dl) was associated positively with lower gestational age and male gender. Hosmer Lemeshow goodness of fit test was used to examine the model where $p = 0.312$.

2.2 Literature review related to the effectiveness of photo therapy

Krishna Madhikari.et.al., (2018) Conducted non-randomized prospective interventional study, to the effectiveness of phototherapy in a tertiary care hospital of Western India. 90 neonates with hyperbilirubinemia were assigned into three groups. 30 neonates in each group to receive phototherapy. Comparison of mean total serum bilirubin was done using one way ANOVA. P-value of <0.05 was considered significant. The three types of phototherapy equipment studied were comparable in efficacy as measured by need for exchange transfusion and mean TSB values at 24 hrs post-phototherapy.

Katie Satom, Tina Slusher, Jared Satrom, (2014) conducted a cohort study was to measure the effectiveness of phototherapy units at a local hospital in Cameroon using an irradiance meter. Phototherapy units ($n = 4$) in one newborn nursery in Cameroon were evaluated. None of the previously existing phototherapy units at this Cameroonian nursery met the standards for effective phototherapy. The irradiance of the three functioning units the average irradiance of the functioning units was $2.87 \mu\text{W}/\text{cm}^2/\text{nm}$, which is substantially below the recommended range of $10\text{--}30 \mu\text{W}/\text{cm}^2/\text{nm}$. With simple improvements, one new prototype unit was developed. Its irradiance was $23.3 \mu\text{W}/\text{cm}^2/\text{nm}$ concluded that irradiance of phototherapy units should be measured, as many local nurseries worldwide may not be delivering effective treatment. Simple and cost-effective changes to phototherapy units can make a substantial improvement in irradiance. In hospitals that used more phototherapy ($r = 0.56$; $P = 0.02$).

Adriane Aver. et.al., (2013) conducted a Randomized controlled trials (RCTs), to investigate the effects of phototherapy applied before, during and after exercises. RCTs reported significant improvement for the main outcome measures related to performance. The time until exhaustion increased significantly compared to placebo by 4.12 s (95 % CI 1.21–7.02, $p < 0.005$) and the number of repetitions increased by 5.47 (95 % CI 2.35–8.59, $p < 0.0006$) after phototherapy. Heterogeneity in trial design and results precluded meta-analyses for biochemical markers, but a quantitative analysis showed positive results in 13 out of 16 comparisons. The most significant and consistent results were found with red or infrared wavelengths and phototherapy application before exercises, power outputs between 50 and 200 mw and doses of 5 and 6 J per point (spot). We conclude that phototherapy (with lasers and LEDs) improves muscular performance and accelerate recovery mainly when applied before exercise.

Charles Lok Wundu, (2013) conducted a Randomised controlled trials to evaluating the effects of prophylactic phototherapy for preterm or low birth weight infants. Low birth weight and premature infants are at major risk for exaggerated hyperbilirubinemia and jaundice that can lead to bilirubin encephalopathy. Phototherapy is the most common treatment for neonatal hyperbilirubinemia and could be most effective in preventing the sequelae of hyperbilirubinemia. To evaluate the efficacy and safety of prophylactic phototherapy for preterm (< 37 weeks gestational age) or low birth weight infants (birth weight < 2500 g). Nine studies of 3449 participants were included. The rate of exchange transfusion was reduced in one study with liberal transfusion criteria (risk ratio (RR) 0.20; 95% confidence interval (CI) 0.13 to 0.31) but not in the other two more recent studies with stringent criteria (typical RR 0.66; 95% CI 0.19 to 2.28).

Mohammed El Sayed Hashim et al., (2011) conducted a randomized controlled study, to the effectiveness of phototherapy. who were full term and healthy with uncomplicated jaundice and who were admitted to the neonatal intensive care unit (NICU) of El-Nasr General Hospital, Port-Said, Egypt. The subjects were randomized in two groups group A (n = 30) received phototherapy with reflectors and group B (n = 30) received conventional phototherapy. Serum bilirubin levels were measured on admission and every 12 hours thereafter. With declining readings, bilirubin was measured once daily until hospital discharge. There was no significant difference in total serum bilirubin on admission between the two groups. On discharge, bilirubin levels significantly decreased in group A compared to group B. There was a reduction in the duration of the hospital stay in group A compared to group B. The only observed complication in the groups was hyperthermia, which was not significantly different between the two groups.

Thomas B Newman, (2011) Conducted a Retrospective cohort study. The effectiveness of phototherapy in Northern California Kaiser Permanente Hospitals. 20,731 newborns ≥ 2000 g and ≥ 35 weeks' gestation born with a "qualifying" total serum bilirubin (TSB) level with ≥ 3 mg/dL of the 2004. American Academy of Paediatrics, that used phototherapy ($r = 0.56$; $P = 0.02$), an association not present at the individual level ($r = 0.13$). Conclusion of the study is instrumental variable analyses may provide biased estimates of treatment.

Perinatol. (2007) conducted a randomized control trial study to evaluate the effectiveness of super LED phototherapy in the study group and twin halogen spotlight phototherapy in the control group. To evaluate the efficacy of a micro processed phototherapy (PT) system with five high intensity light emitting diodes (Super LED) for the treatment of neonatal hyperbilirubinemia of premature infants. Randomly assigned 66 infants >35 weeks of gestation to receive phototherapy using

an LED device or BB. In addition to phototherapy from above, all infants also received phototherapy from below using four BB tubes or a fiber optic pad. After 15+/-5 hours of phototherapy, the rate of decline in the total serum bilirubin (TSB) was 0.35+/-0.25 mg/dl/h in the LED group vs 0.27+/-0.25 mg/dl/h in the BB group (P=0.20). LED phototherapy is as effective as BB phototherapy in lowering serum bilirubin levels in term and near-term newborns. Efficacy of new micro processed phototherapy system with five high intensity light emitting diodes (Super LED).

S.D.Jokomuljanto, et.al., (2006) conducted a randomized controlled trial to the effectiveness of phototherapy for neonatal jaundice. Level one nursery of the Hospital University Sains Malaysia, Kelantan, Malaysia. 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). The primary outcome was the mean difference in total serum bilirubin measured at baseline and after 4 hours of phototherapy. The secondary outcome was the duration of phototherapy. The mean (standard deviation) decrease in total serum bilirubin levels after 4 hours of phototherapy was significantly ($p<0.001$) higher in the study group (27.62 (25.24) $\mu\text{mol/l}$) than in the control group (4.04 (24.27) $\mu\text{mol/l}$). Cox proportional hazards regression analysis indicated that the median duration of phototherapy was significantly shorter in the study group (12 h) than in the control group (34 h; χ^2 change 45.2; $p<0.001$; hazards ratio 0.20; 95% confidence interval 0.12 to 0.32). No difference in adverse events was noted in terms of hyperthermia or hypothermia, weight loss, rash, loose stools or feeding intolerance. Hanging white curtains around phototherapy units significantly increases efficacy of phototherapy in the treatment of neonatal jaundice without evidence of increased adverse effects.

Daniel Saidman, Jonathan Moise. et.al., (2003) conducted a prospective randomized study in Cholim and Misgav-Ladach University affiliated community hospitals in Jerusalem. To determine the efficacy of blue versus blue-green phototherapy in using new light sources A total of 114 jaundiced, but otherwise healthy term infants who met the entry criteria for phototherapy set by the American Academy of Paediatrics' Practice Parameter. The duration of phototherapy and the rate of decrease in total serum bilirubin transient rash was the most commonly observed side effect. The three types of phototherapy equipment studied were comparable in efficacy as measured by need for exchange transfusion and mean TSB values at 24 hrs post phototherapy.

2.3 Literature review related to continuous versus intermittent phototherapy

Khaliq. (2016) conducted a randomized controlled study was carried out on neonates admitted to the neonatal unit of Department of Paediatric Medicine, Ward A, Lady Reading Hospital, Peshawar from. A total of 258 patients were enrolled for the study after fulfilling the inclusion/ exclusion criteria to compare the decrease in serum bilirubin after applying continuous/intermittent phototherapy for the treatment of neonatal jaundice. To compare the mean decrease in serum bilirubin after intermittent versus continuous phototherapy in the treatment of jaundice neonatorum. Mean age of the patients was 3.89 ± 1.83 ($p=.91$) days, the mean baseline bilirubin was $17.56 \text{mg/dl} \pm 1.42$ ($p=.36$), while the mean follow-up bilirubin was $12.85 \text{mg/dl} \pm 1.65$ ($p=.95$), and the mean difference between the baseline and follow-up bilirubin was $4.7 \text{mg/dl} \pm 1.19$ ($p=.32$). For the group A babies, the mean difference between the baseline and follow-up bilirubin was $4.78 \text{mg/dl} \pm 1.20$ ($p=.32$). For the group B babies, the mean difference between the baseline and follow-up bilirubin was $4.63 \text{mg/dl} \pm 1.18$ ($p=.32$). The difference between the mean age on admission, mean baseline bilirubin, mean follow-up bilirubin, and the mean decrease in serum bilirubin for both the

groups A and B was statistically not significant. Intermittent and continuous phototherapies were found to be equally effective. Because of its additional benefits intermittent phototherapy can be adopted as a routine procedure instead of continuous phototherapy in neonatal care units.

Monica Sachdeva, Hemasree Kandraju. (2014) Conducted a non inferiority randomized controlled trial healthy late preterm and term neonates. Intermittent phototherapy with "12 hours on and then 12 hours off" schedule in comparison with continuous phototherapy for neonatal hyperbilirubinemia may save costs and decrease anxiety of parents. Healthy late preterm (>34 weeks) and term neonates with neonatal hyperbilirubinemia under phototherapy for 8 h and total serum bilirubin (TSB) < 18 mg/dL were randomized either into intermittent (IPT) or continuous (CPT) group. Infants in IPT group received 12 hours on and 12 hours off cycles of phototherapy. In both arms, phototherapy was continued until TSB < 13 mg/dL. Primary outcome was rate of fall of bilirubin. Seventy-five.

Hendrik Jan Vreman. (2004) conducted a nonrandomized prospective interventional study to the effectiveness of phototherapy in a tertiary care hospital of Western India. Ninety neonates with phototherapy range hyperbilirubinemia were assigned into three groups. 30 neonates in each to receive a Phototherapy using one of the three types of phototherapy machines. Total serum is the mainstay of treatment for about 3% of neonates in India who infants (IPT n = 36 vs. CPT n = 39) were enrolled in the study. The rate of fall of bilirubin was significantly higher with "IPT" phototherapy ($p = 0.002$). In term and late preterm infants with non-hemolytic moderate hyperbilirubinemia, intermittent phototherapy with 12 hours on and 12 hours off cycles is as efficacious as continuous phototherapy.

Mohammad Mehdi, Houshmandi, Rakhsha, (2013) conducted a randomized clinical trial, conducted among 100 infants at Children's Hospital of

Bandar-Abbas. Infants randomly divided into two groups: 39 infants were in intermittent phototherapy (a hour phototherapy and a clock interrupt phototherapy) and 45 infants in continuous phototherapy (two hours and forty-five minutes, phototherapy and 15 minutes off phototherapy). The purpose of this study was to compare the effect of continuous and intermittent phototherapy to minimize levels of neonatal bilirubin levels. Demographic data, type of feeding and phototherapy complications for neonatal were recorded. Total bilirubin was measured 12 hours after starting phototherapy then with 12 hours interval. The mean age, weight, nutrition and gender distribution was not significantly different between the two groups. Bilirubin levels were significantly decreased in both groups ($p < 0.001$). Decrease of Hyperbilirubinemia in continuous group was more than alternative group ($p < 0.01$). There was no Significant difference between the duration of phototherapy and complication rates in both groups. Continuous phototherapy was more effective than intermittent to decrease levels of hyperbilirubinemia in full term neonates, but duration of phototherapy for comparing two methods were identified.

Eghbalian, F.Sabzian,(2013) conducted a controlled randomized clinical trial study performed on 96 fullterm neonates admitted in the neonatal ward of Besat hospital of Hamadan city. This study was conducted to compare the efficacy of intermittent and continuous phototherapy. The neonates were randomly divided in to two groups. Continuous phototherapy receives 2 hours on and 30 minutes off. The intermittent group received phototherapy on and off for 1 hour bilirubin levels in two groups were measured 12, 24, 36, 48, hours after starting phototherapy. This significant difference was present in both groups. Although the average volume of skin bilirubin every 24 hours after treatment was lower in the intermittent phototherapy group than the continuous phototherapy group, this difference was not statistically significant. ($p = .236$). Mean duration of hospitalization of infants in the

intervention group was significantly lower than the control group (2.09 versus 3.03 d, $p < .001$).

Muyesser Abdulkareem. (2010) conducted a prospective clinical study all newborns with neonatal jaundice admitted to neonatology department of Raperin hospital in Arbil, between August 2009 and February 2010, for phototherapy were included in the study. To assess intermittent phototherapy for the treatment of neonatal jaundice in comparison with continuous phototherapy. The patients were randomly divided into 2 groups. In the control group continuous phototherapy defined as two hours on and half an hour off was used while in the study group intermittent phototherapy defined as one hour on and one hour off was used. Mean total serum bilirubin level in both continuous and intermittent phototherapy groups were compared after each 12, 24, 36, 48, and 72 hours of commencing phototherapy. The effect of bio-demographic characteristics (gender, gestational age, birth weight, age in hours, and bilirubin levels at admission) were also studied. There was no any significant difference between the two groups regarding mean total serum bilirubin measured at every 12 hours. There was no any significant difference between the 2 groups regarding bio-demographic characteristics ($p > 0.05$). Intermittent phototherapy is as effective as continuous one in the treatment of indirect hyperbilirubinemia in full term infants and in the absence of haemolytic causes.

Pedram Niknafs. (2008) Conducted a randomly controlled study to compare the efficacy of intermittent with continuous phototherapy, on 114 neonates with indirect hyperbilirubinemia. Inclusion criteria were body weight above 2000 grams, absence of other concomitant diseases, and hyperbilirubinemia neither requiring intensive phototherapy nor exceeding the range of exchange transfusion. The neonates were randomly divided into two groups. Continuous phototherapy group received phototherapy on and off for 2 hours and half an hour respectively and the intermittent

phototherapy group on and off for one hour. The phototherapy units were identical and serum total bilirubin levels were measured every 12 hours after starting phototherapy. Two groups were matched regarding weight and risk factors such as ABO and Rh incompatibility. The difference of total serum bilirubin levels between two groups was insignificant at the start of phototherapy and also after 12, 24, 36 and 48 hours ($P>0.2$). Intermittent phototherapy defined as one hour on and one hour off is as effective as continuous phototherapy defined as 2 hours on and half an hour off, in reducing total serum bilirubin level in full term babies. Among 114 neonates, 58 (50.9%) were female and 56 (49.1%) were male. The mean age of neonates at admission was 5.44 days with standard deviation of 2.69 (range 2-15 days) (Table 1). Mean weight of neonates at admission was 3072 gram with standard deviation of 558.2 (range 2000-4350 gr). Mean weight of neonates in continuous group was 3070.1 gram with standard deviation of 579.0 and in intermittent group was 3073.6 gram with standard deviation of 541.6. There was not any significant difference in the weight of neonates in two groups ($P>0.9$).

Horn. (2006) Physiological jaundice results from a high level of circulating unconjugated bilirubin due to accelerated red cell break-down, reduced liver bilirubin handling capacity and increased enterohepatic circulation. Phototherapy converts the bilirubin through structural photo isomerization and photo-oxidation into excretable products. This molecular conversion occurs when bilirubin accumulating in the skin is exposed to light of wave-lengths 425 - 475 nm (blue-green spectrum). The effectiveness of phototherapy is related to the area of skin exposed, the radiant energy, the sources and wave-length of the light, the relationship between them.

2.4 Conceptual frame work

A conceptual frame work is one that present typically constructed to provide general explanation of relationship between the concepts of research study they are usually constructed by using researcher own experience, previous research findings or several theories or models, The investigator adopted modified King's goal attainment theory 1981 based on the personal interpersonal systems including perception, judgement action reaction Interaction and transaction. Theory focused on interpersonal system reflects King's belief that the practice of nursing is differentiated from that of other health profession by what nurses do with and for individual. The major elements of the theory are in the interpersonal system in which two people, who are usually strangers come together in a health care organisation to help and be helped to maintain a state of health that permits functioning in roles.

The investigator adopted goal attainment as a basic theory for conceptual framework. Which is aimed at effectiveness of continuous versus intermittent phototherapy on level of Bilirubin among babies with hyperbilirubinemia.

Major concepts describe these phenomenon

Perception

Perception in each person representation of reality the elements of perception are importing of energy from the environment and organizing it.

In this study the investigator, perceives that there is the need for the level of bilirubin among babies with hyperbilirubinemia care givers perceive the importance and benefits for phototherapy care.

Judgement

Judgement is decision which is made by both the researcher and participants. The researcher identifies the level of bilirubin by using Adopted Kramer's Scale

decided give phototherapy care among babies with hyperbilirubinemia. Care givers decide to accept phototherapy care.

Action

Action refers to the activity to achieve the goal what the individual perceives. In this study it is a mutual goal setting to decrease the bilirubin level. Action by the investigator plan and collect socio demographic data and assess the level of hyperbilirubinemia by Adopted Kramer's scale.

Action by care givers with phototherapy care givers accepted and they were ready to participate in nursing intervention for their babies.

Reaction

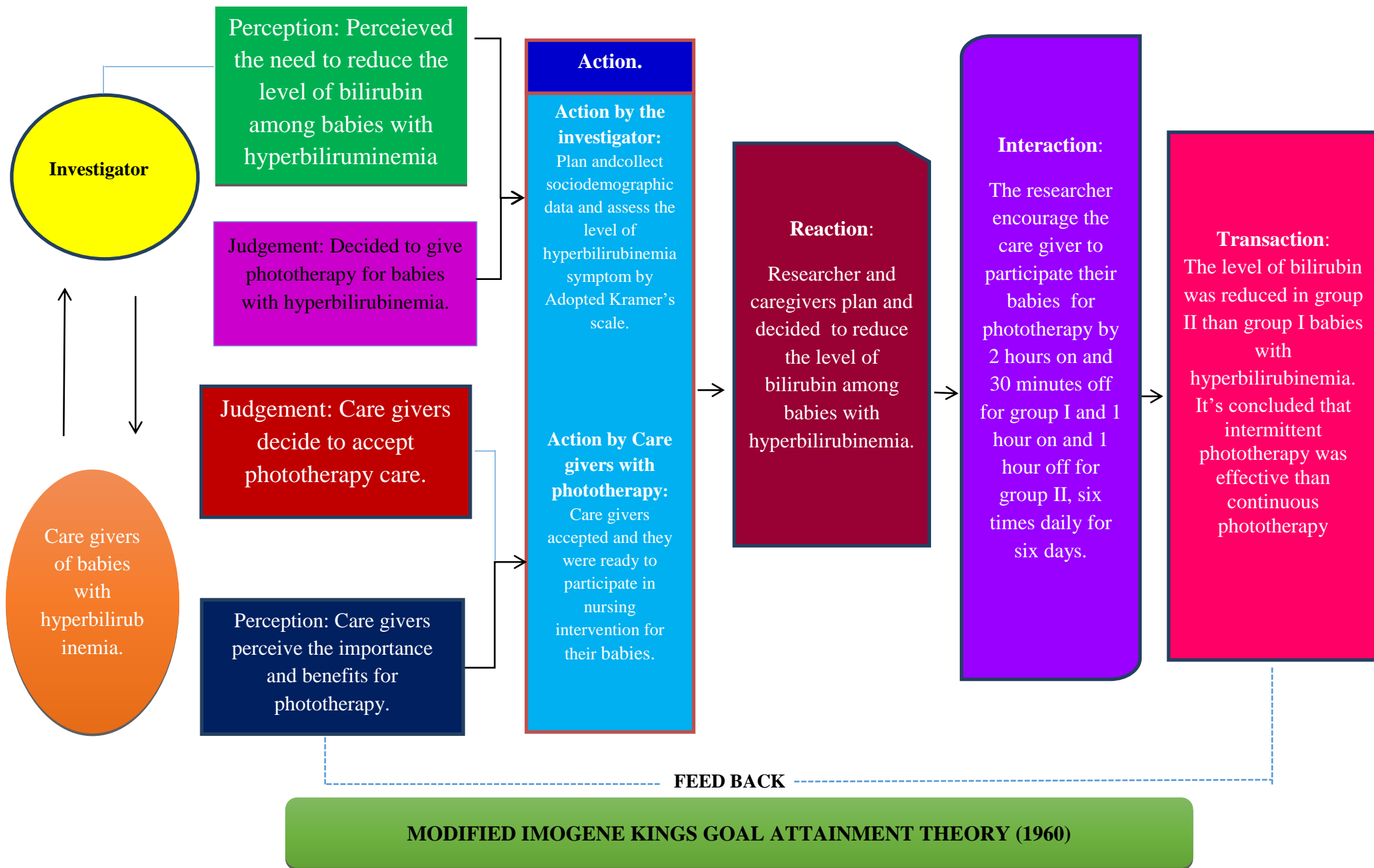
Researcher and care givers plan and decided to reduce the level of bilirubin among babies with hyperbilirubinemia.

Interaction

The researcher encourage the care giver to participate their babies for phototherapy by 2 hours on and 30 minutes off in interventional group I. Interventional group II to receive intermittent phototherapy six times daily for six days.

Transaction

Reduction in the level of bilirubin among babies with hyperbilirubinemia is higher in interventional group I than in group II It is concluded that intermittent phototherapy is effective than in continuous phototherapy.



RESEARCH METHODOLOGY

CHAPTER - III

RESEARCH METHODOLOGY

The methodology of research indicates the general pattern of organizing the procedure for assembling valid and reliable data for investigation. This chapter provides a brief explanation of the method adopted by the investigator in this study. It includes the research approach, research design, and variables, setting of the study, population, sample, sample size, sampling technique, description of the tool, pilot study, data collection procedure and plan for data analysis.

The present study aimed a study to evaluate the effectiveness of continuous versus Intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai-20.

3.1 Research approach

The research approach is the most essential part of any research. The entire study is based on it. A research approach tells the researcher about the collection of data that is what to collect, when to collect, how to collect and how to analyse. It also helps the researcher with suggestions of possible conclusions to be drawn from the data.

According to Polit and Hungler (1999)

Evaluative research is an applied format research that involves finding out how well a program, practice, procedure or policy is working. It involves the collection and analysis of information relating to the functioning of a program or procedure, with the aim of assessing its effectiveness.

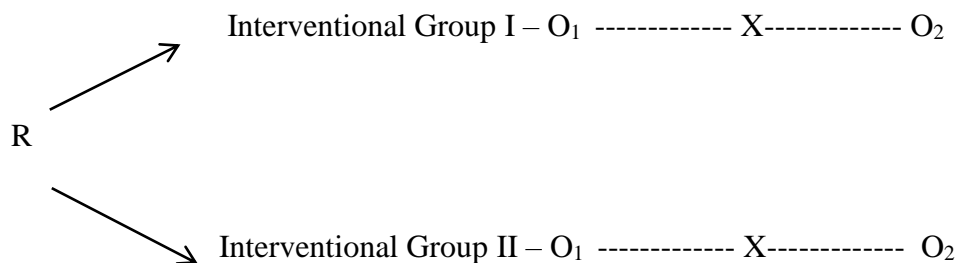
A quantitative approach was adopted in the present study as the investigation is aimed at evaluating the effectiveness of level of bilirubin among children.

3.2 Research design

According to Kothari. C.R., (2003) “A research design is defined as the overall plan for collecting and analysing data, including a specification for enhancing the internal and external validity of the study”.

The research design is the plan, structure and strategy of investigations of answering the research question. It is the overall plan or blueprint the researcher select to carry out the study.

The research design selected for this study was True experimental - Pre test and Post test design.



Key

Interventional group-I	-	continuous phototherapy
Interventional group -II	-	Intermittent phototherapy
O ₁	-	Observation before intervention
X	-	Intervention
O ₂	-	Observation after intervention

3.3 Research Variables

The variable is, “an attribute of a person or object that varies, that is taken a different values”

(Polit and Hunger).

Independent variable

The independent variable stands alone and is not dependent on another. It is the cause for an action. In this study independent variable is the continuous phototherapy for Group I and Intermittent phototherapy Group II.

Dependent variable

Dependent variable is the effect of the action of the independent variable and cannot exist by itself. In this study, the dependent variable is Hyperbilirubinemia.

Socio demographic variables

It consists of socio demographic data of babies and their parents. The socio demographic variables age, sex, religion, residence, educational status of the father, educational status of the mother, occupation of the father, occupation of the mother, type of family, monthly income.

Clinical variables

It includes age of the new born, birth weight, bowel sound and passing meconium, urine output, hydration status, changing position, Rh incompatibility, blood type, moulding of skull, duration of phototherapy.

3.4 Setting of the study

The setting is the physical location and condition in which data collection takes place in the study.

(Polit and Hunger)

The setting was selected based on acquaintance of the investigator with the institution, feasibility of conducting the study, availability of the sample, permission and proximity of the setting for investigation. The study setting selected, for this study is Neonatal Intensive care unit, at Government Rajaji Hospital, Madurai.

3.5 Population

The population is defined as the entire aggregation of cases that meet a designed criterion.

Target population

The target population of this study was babies undergone phototherapy in NICU.

Accessible population

In this study accessible population was babies undergone phototherapy in NICU at Government Rajaji, Hospital, Madurai.

3.6 Sample

The sample is a subset of the population selected to participate in a research study.

Baby with Hyperbilirubinemia those who met the inclusion criteria, in NICU at Government Rajaji Hospital, Madurai.

3.7 Sample size

In this study the sample size consists of 60 new born babies with Hyperbilirubinemia among 60 samples, 30 samples in group I and 30 samples in group II at NICU Government Rajaji Hospital, Madurai.

3.8 Sampling technique

The sampling technique of the study was selected by probability (Simple random) sampling technique.

3.9 Criteria for sampling Inclusion Criteria

- ❖ Babies who undergone bilirubin level above 5mg/dl among babies with hyperbilirubinemia.
- ❖ Babies who have weight from 1.5kg to 3kg.
- ❖ Both male and female babies are included.

Exclusion Criteria

- ❖ Babies who are having congenital abnormalities.
- ❖ Babies who are on ventilator.
- ❖ Parents who are not willing.

3.10 Development and description of tool

Data Collection tools are the procedures or instruments used by the researcher to observe or measure key variables in the research problem. Adopted Kramer's scale was selected to assess on level of bilirubin among babies with hyperbilirubinemia. It was considered to be the most appropriate instrument to elicit the response from subjects who able to understand Tamil.

The tool was organized into two sections.

Section – A: Deals with socio demographic Variables

It consists of socio demographic data of the babies and their parents. The socio demographic variables age, sex, religion, residence, educational status of the father, educational of the mother, occupation of the father, occupation of the mother, type of family, monthly income.

Section –B Clinical variables

It includes age of the newborn, birth weight, bowel sound and passing meconium, urine output, hydration status, changing position, Rh incompatibility, blood type, moulding of skull, duration of phototherapy.

Section – C: Adopted Kramer's Scale

Adopted Kramer's scale in face 5mg, chest and upper abdomen 10mg, thigh and upper arm 4mg, legs and forearm 15mg, palms and sole above 15 mg.

Scoring Procedure

Section- A

There was no score given for socio demographic variables.

Section-B

There was no score given for clinical variables.

Section-C

Adopted Kramer's scale describe the level of bilirubin among babies.

Scoring interpretation

Zone I face	-	5mg/dl
Zone II chest and upper abdomen	-	10mg/dl
Zone III Thighs and upper arms	-	12mg/dl
Zone IV Legs and forearm	-	15mg/dl
Zone V palms and sole	-	Above 15mg/dl

Scoring interpretation

Below 5mg/dl	-	NORMAL
5-10mg/dl	-	MILD
10-15mg/dl	-	MODERATE
Above15mg/dl	-	SEVERE

Content Validity

Validity is the degree to which an instrument measures what is intended to measure.

(Polit and Hungler 1995)

The content validity was obtained from three Child health nursing experts in nursing and two professors of Paediatric NICU, at Government Rajaji Hospital, Madurai. Minimal modification was made in the section A & Section B of socio and clinical variables. The modified tool was used for data collection and content validity was obtained.

Reliability of the tool

The accuracy and consistency of the research tool are called reliability. Adopted Kramer's scale-this standardized scale reliability is $r=0.78$.The Reliability of

an instrument is the degree of consistency with which it measures the attribute and it is supposed to be measuring over a period of time. The tool was a standardized one which underwent test and retest method.

3.11 Pilot Study

The pilot study was conducted in NICU at Government Rajaji Hospital, Madurai from 21.05.2018 to 27.05.2018 to test the feasibility of setting, samples, relevance and practicability of the intervention among 10 babies with Hyperbilirubinemia. Informed written and oral consent was obtained from the mothers of babies with Hyperbilirubinemia. Subjects were selected by simple random sampling technique. Pre assessment level of Hyperbilirubinemia was done with the help of Adopted Kramer's scale. In group-I provide Continuous phototherapy 2 hours on 30 minutes off and group-II provide intermittent phototherapy 1 hour on 1 hour off, six times daily for 6 consecutive days. The post test was conducted at 6th day by using Adopted Kramer's scale. The findings evidenced that, there was significant statistical difference in pre-test and post test scores on the level of bilirubin. The pilot study findings revealed that setting was feasible and tool was applicable to conduct the main study. The study was practically feasible to be conducted with a large sample size. The findings of the pilot study revealed that the tool was feasible and practicable.

Ethical consideration

This study was conducted after the approval from the Ethical committee, Madurai Medical College, Madurai-20. All respondents were carefully informed about the purpose of the study and their part during the study and how the privacy was guarded. The confidentiality of the study result was ensured. Informed oral and written permission was obtained from all participant.

3.12 Procedure for data collection

After obtaining permission from the Principal, College of Nursing, Director, Institute of Child Health and Research centre, Ethical committee on the first day of data collection, the investigator introduced himself and explained the nature and purpose of the study to the mother of babies with hyperbilirubinemia. Subjects were selected based on the inclusion criteria. Consent was obtained from the care givers of the participants and confidentiality of their responses was assured. Subjects for the study were undergone the pre assessment of level of bilirubin by using Adopted Kramer's scale. Then investigator applied group I provide Continuous phototherapy 2hour on 30 minutes off and group-II provide intermittent phototherapy 1 hour on 1 hour off, 6 times a day for 6 consecutive days. The post test was conducted at 6th day by using Adopted Kramer's scale after that the investigator was assessed the level of bilirubin on babies by means of post test using Adopted Kramer's scale. Proposed study duration is 4 to 6 weeks.

3.13 Plan for Data Analysis

The data analysis will be involved the translation of information collected during the course of research project into an interpretable and managerial form. It involves the use of statistical procedures to give an organization and meaning to the data. Descriptive and inferential statistics were used for data analysis. To compute the data, a master sheet was prepared by the investigator. The data analysed using both descriptive and inferential statistics.

Descriptive statistics Include

- 1) Frequency and percentage distribution of the socio demographic and clinical variables.

- 2) Mean and standard deviations of pre assessment and post assessment for level of bilirubin.

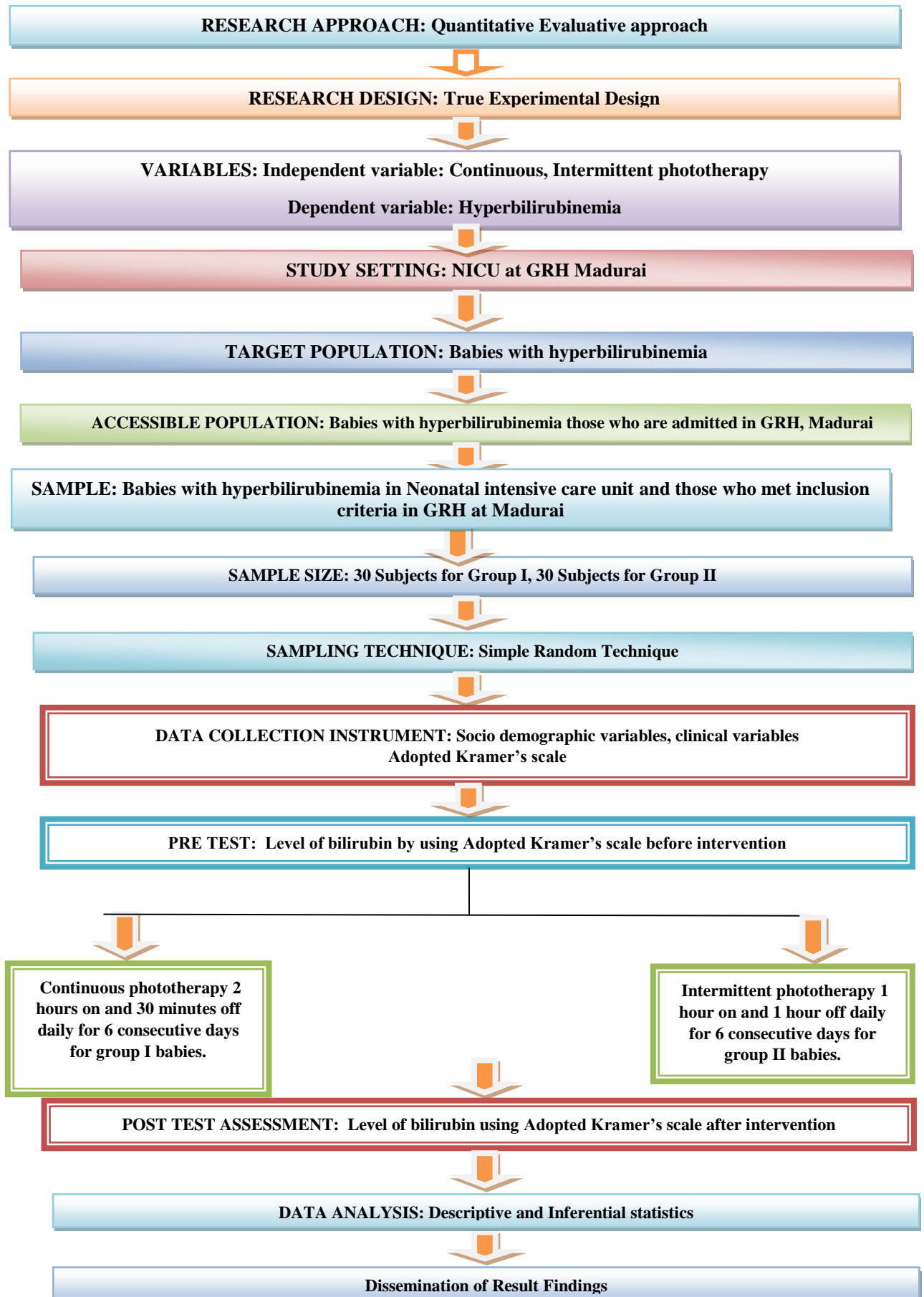
Inferential statistics include

- 1) Student unpaired ‘t’ test for comparison for pre assessment and post assessment to assess the effectiveness of level of bilirubin.
- 2) Chi- square test to analyse the association between the level of bilirubin and socio -demographic variables.

3.14 Protection of Human Rights

Research proposal was approved by the dissertation committee of College of Nursing, Madurai Medical College, Madurai, Head of the Department of Paediatrics, in Institute of Child Health and Research Centre, at Government Rajaji Hospital, Madurai. An oral and written consent of each mothers of children with level of bilirubin can be obtained before starting the data collection. They were explained that they may withdraw from the study at any time without any penalty. Assurance will be given to the subjects that confidentiality will be maintained throughout the study.

3.15 Schematic representation of research methodology



**DATA ANALYSIS
AND
INTERPRETATION**

CHAPTER - IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the description of sample, analysis and interpretation of the data collected to evaluate the achievement of the objectives of the study. Statistical procedure enabled the investigator to reduce, summarize, organize, interpret and communicate the numeric information. Statistical analysis is a method of rendering quantitative information meaningful and intelligible. In this chapter the data collected were edited, tabulated, analysed and interpreted. The findings were organized and presented in the following orderly sections.

Presentation of data

The study findings of the samples are presented in the following sections.

Section I

Distribution of Socio demographic and clinical variables among babies with hyperbilirubinemia in interventional group I and group II.

Section II

Description of pre test and post level of bilirubin among babies with hyperbilirubinemia in Interventional group I

Section III

Description of pre test and post level of bilirubin among babies with hyperbilirubinemia in Interventional group I and group II

Section IV

Comparison of post test level of bilirubin among interventional group I and group II

Section V

Association between post test the level of bilirubin with their selected socio demographic and clinical variables among babies in Interventional Group I and Group II.

Section I

Distribution of socio demographic and clinical variables among babies with hyperbilirubinemia in interventional group I and group II

Table 1

Frequency and percentage distribution of socio demographic variables among babies with hyperbilirubinemia

n = 60

Socio demographic variables		Group				χ^2
		Group I		Group II		
		f	%	f	%	
Age	1-15 days	30	100.00%	30	100.00%	$\chi^2=0.00$ P=1.00 (NS)
	15-28 days	0	0.00%	0	0.00%	
Sex	Male child	17	56.67%	20	66.67%	$\chi^2=0.63$ P=0.43 (NS)
	Female child	13	43.33%	10	33.33%	
Religion	Hindu	22	73.33%	20	66.67%	$\chi^2=0.42$ P=0.80 (NS)
	Christian	5	16.67%	7	23.33%	
	Muslim	3	10.00%	3	10.00%	
Place of Domicile	Urban	14	46.67%	12	40.00%	$\chi^2=0.27$ P=0.60 (NS)
	Rural	16	53.33%	18	60.00%	
Education of Father	No formal education	3	10.00%	3	10.00%	$\chi^2=0.10$ P=0.99 (NS)
	Primary education	11	36.67%	10	33.33%	
	High school education	10	33.33%	11	36.67%	
	Graduate	6	20.00%	6	20.00%	
Education of Mother	No formal education	2	6.67%	2	6.67%	$\chi^2=2.91$ P=0.40 (NS)
	Primary education	10	33.33%	9	30.00%	
	High school education	12	40.00%	17	56.66%	
	Graduate	6	20.00%	2	6.67%	

Occupation of Father	Sedentary worker	8	26.67%	10	33.34%	$\chi^2=0.40$ P=0.81 (NS)
	Moderate worker	10	33.33%	10	33.33%	
	Heavy worker	12	40.00%	10	33.33%	
Occupation of Mother	Sedentary worker	12	40.00%	15	50.00%	$\chi^2=0.64$ P=0.72 (NS)
	Moderate worker	16	53.33%	13	43.33%	
	Heavy worker	2	6.67%	2	6.67%	
Type of family	Joint Family	14	46.67%	13	43.33%	$\chi^2=0.07$ P=0.79(NS)
	Nuclear Family	16	53.33%	17	56.67%	
Monthly Family income	Rs. 2000- 4000	5	16.67%	4	13.33%	$\chi^2=0.67$ P=0.71 (NS)
	Rs. 400I- 6000	9	30.00%	12	40.00%	
	Rs. 6001-10,000	16	53.33%	14	46.67%	

Table 1 explains the frequency and percentage distribution of babies according to their selected socio demographic variables with hyperbilirubinemia in Interventional group I and group II

According to the age group, majority of the babies 30 (100 %) belongs to the age group between 1-15 days and none of them belongs to the age group between the age of 15 -28 days, both in interventional group I and group II.

With regard to the sex, in interventional group I majority of the babies 17 (56.67%) were males and remaining 13 (43.33 %) were females. In interventional group II majority of the babies 20 (66.67%) were males and remaining 10 (33.33 %) were females.

Based on the religion, in interventional group I, majority of the babies 22 (73.33 %) were Hindu, 5 (16.67 %) were Christian and 3 (10.00 %) were Muslim. In interventional group II, majority of the subjects 20 (66.67%) were Hindu, 7 (23.33%) were Christian, and 3 (10.00%) were Muslim.

With regard to place of domicile, in interventional group I, majority of the babies 16 (53.33%) were hailed from rural area and remaining 14 (46.67 %) were

hailed from urban area. In interventional group II majority of the babies 18 (60.00 %) were hailed from rural area. 12 (40.00 %) were hailed from urban area.

On the basis of the education of father in interventional group I majority 11 (36.67%) were studied up to primary education, 10 (33.33%) were studied up to high school education, 6 (20.00%) were studied up to graduates and remaining 3 (10.00%) of them no formal education. In Interventional group II majority 11 (36.67%) were studied up to high school education, 10 (33.33%) were studied up to primary school education, 6 (20.00%) were studied up to graduates and remaining 6 (20.00%) of them no formal education.

On the basis of education of mother in interventional group I majority 12(40.00%) were studied up to high school education, 10 (33.33%) were studied up to primary school education and 6 (20.00%) were studied up to graduates and 2 (6.67%) of them no formal education. In group II majority 17 (56.66%) were studied up to high school education, 9 (30.0%) were studied up to primary school education 2 (6.67 %) were studied up to graduates and 2 (6.67%) of them non formal education.

In the view of occupation of fathers, in interventional group I majority 12 (40.00%) were heavy worker, 10 (33.33%) were moderate worker and 8 (26.67%) were sedentary worker. In interventional in group II majority 10 (33.34%) were sedentary worker, 10 (33.33 %) were moderate worker and remaining 10 (33.33%) were heavy worker.

In the view of occupation of mothers, in interventional group I majority 16 (53.33%) were moderate worker, 12 (40.00%) were sedentary worker and remaining 2 (6.67%) were heavy worker. In interventional group II majority 15

(50.00%) were sedentary worker, 13 (43.33%) were moderate worker and remaining 2 (6.67%) were heavy worker.

With regard to type of family, in interventional group I majority 16 (53.33%) were had nuclear family and remaining 14 (46.67%) were had joint family. In interventional group II majority 17 (56.67%) were had nuclear family and remaining 13 (43.33%) were had joint family.

While stating monthly family income, in group I majority 16 (53.33%) were earned between Rs. 6000-10,000, 9 (30.00%) were earned between Rs. 4000-6000, 5 (16.67%) were earned between Rs. 2000-4000. In interventional group II majority 14 (46.67%) were earned between Rs. 6000- 10,000, 12 (40.00%) were earned between Rs. 4000-6000, 4 (13.33%) were earned between Rs.2000.

Distribution of subjects according to age



Figure 2: Bar diagram shows the distribution of babies according to their age.

Majority of the babies 30 (100%) belongs to the age group between 1-15 days and none of them belongs to the age group between 15 -28 days, both in interventional group I and group II.

Distribution of subjects according to sex

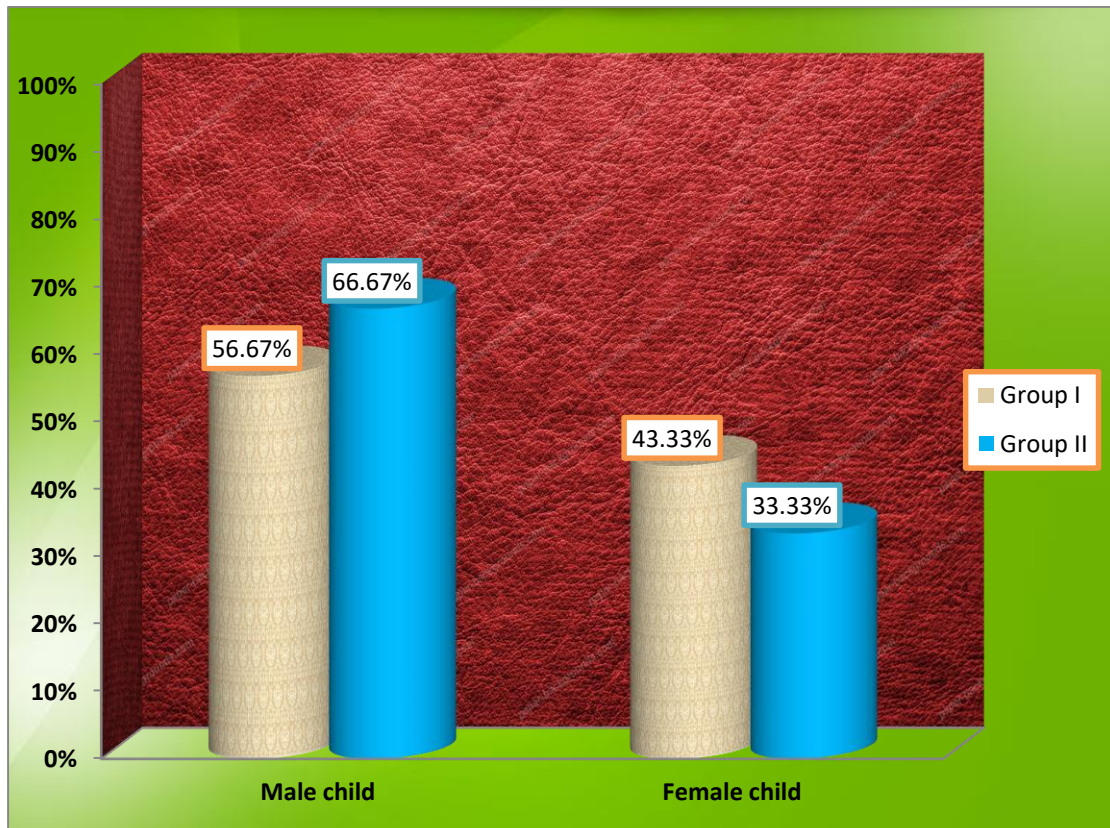


Figure 3: Cylindrical diagram shows the distribution of babies according to their sex.

In interventional group I majority of the babies 17 (56.67%) were males and remaining 13 (43.33 %) were females.

In interventional group II majority of the babies 20 (66.67%) were males and remaining 10 (33.33 %) were females.

Distribution of subjects according to religion

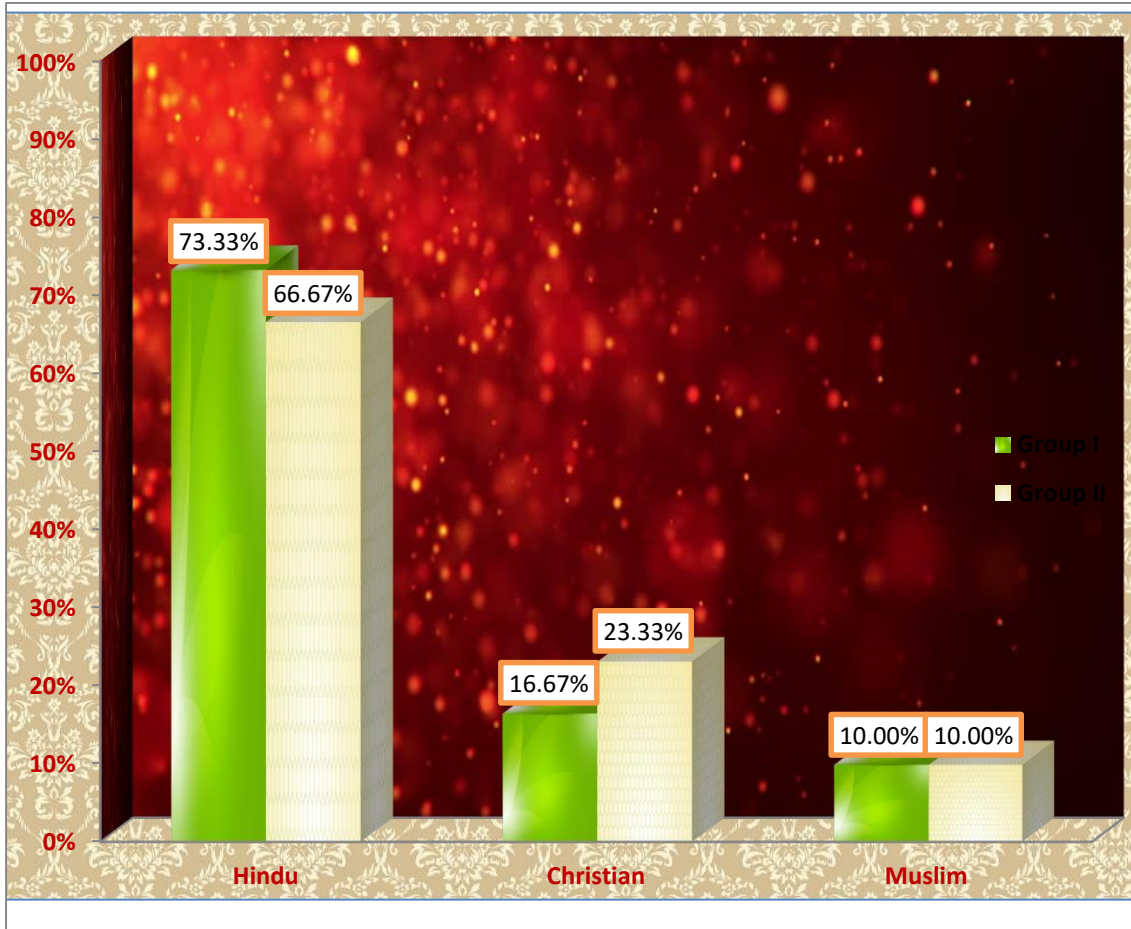


Figure 4: Multiple bar diagram shows the distribution of babies according to their religion.

In interventional group I, majority of the babies 22 (73.33 %) were Hindu, 5 (16.67 %) were Christian and 3 (10.00 %) were Muslim.

In interventional group II, majority of the subjects 20 (66.67%) were Hindu, 7 (23.33%) were Christian, and 3(10.00%) were Muslim.

Distribution of subjects according to their place of domicile

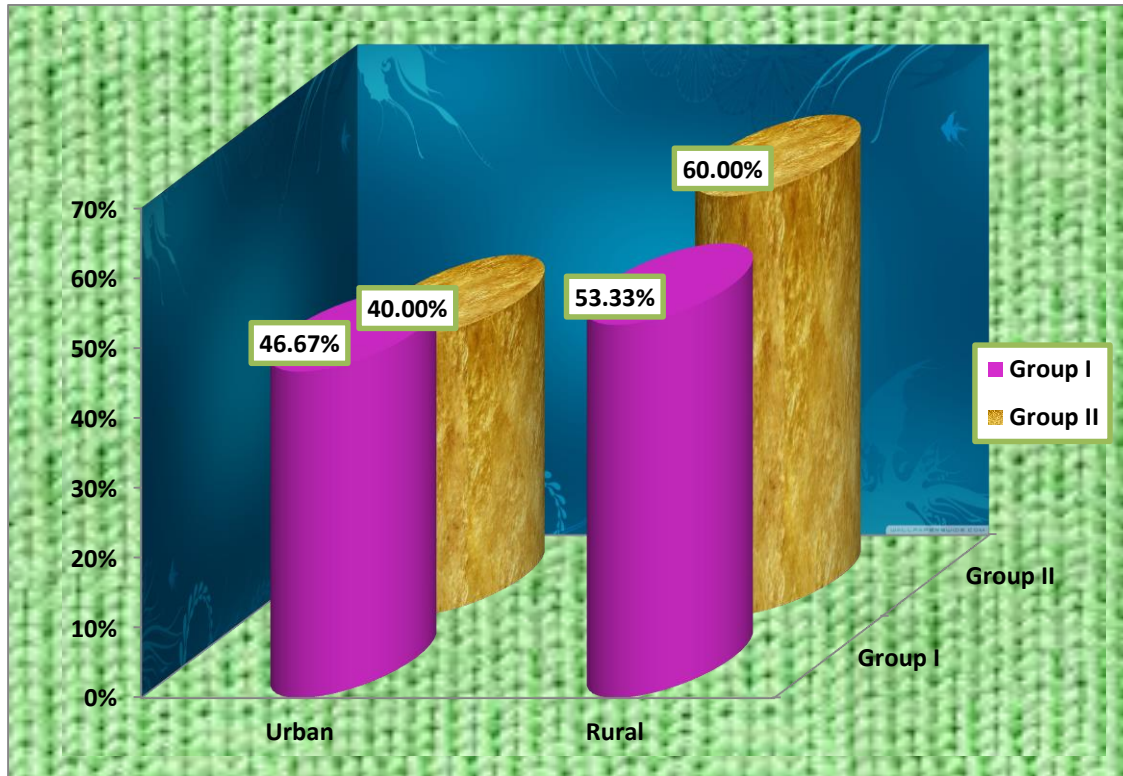


Figure 5: Multiple cylindrical diagram shows the distribution of babies according to their place of domicile

In interventional group I, majority of the babies 16 (53.33%) were hailed from rural area and remaining 14 (46.67 %) were hailed from urban area.

In interventional group II, majority of the babies 18 (60.00 %) were hailed from rural area. 12 (40.00 %) were hailed from urban area.

Distribution of subjects according to their father's educational status

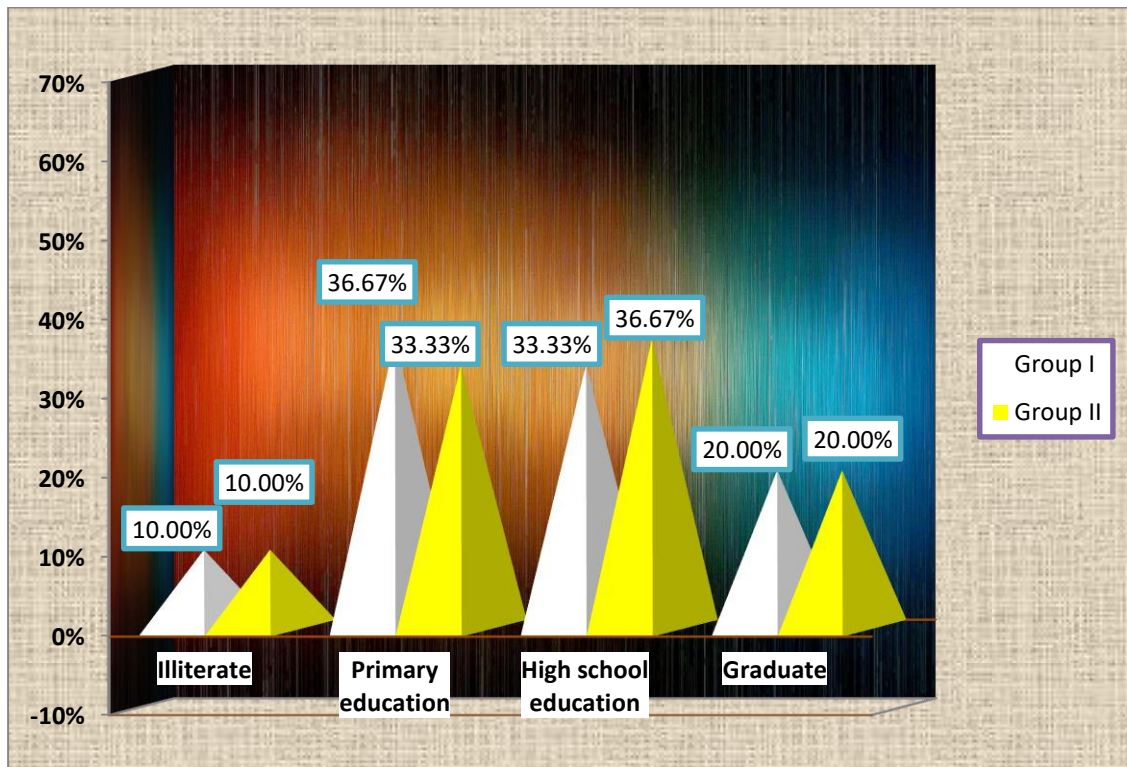


Figure 6: Pyramid diagram shows the distribution of babies according to their father's educational status.

In interventional group I, majority of the babies 11 (36.67%) were studied up to primary education, 10 (33.33%) were studied up to high school education, 6 (20.00%) were studied up to graduates, 3 (10.00%) of them no formal.

In Interventional group II, majority of the babies 11(36.67%) were studied up to high school education 10 (33.33%) were studied up to primary school education 6 (20.00%) were studied up to graduates and 3 (10.00%) of them no formal.

Distribution of subjects according to their mother's educational status

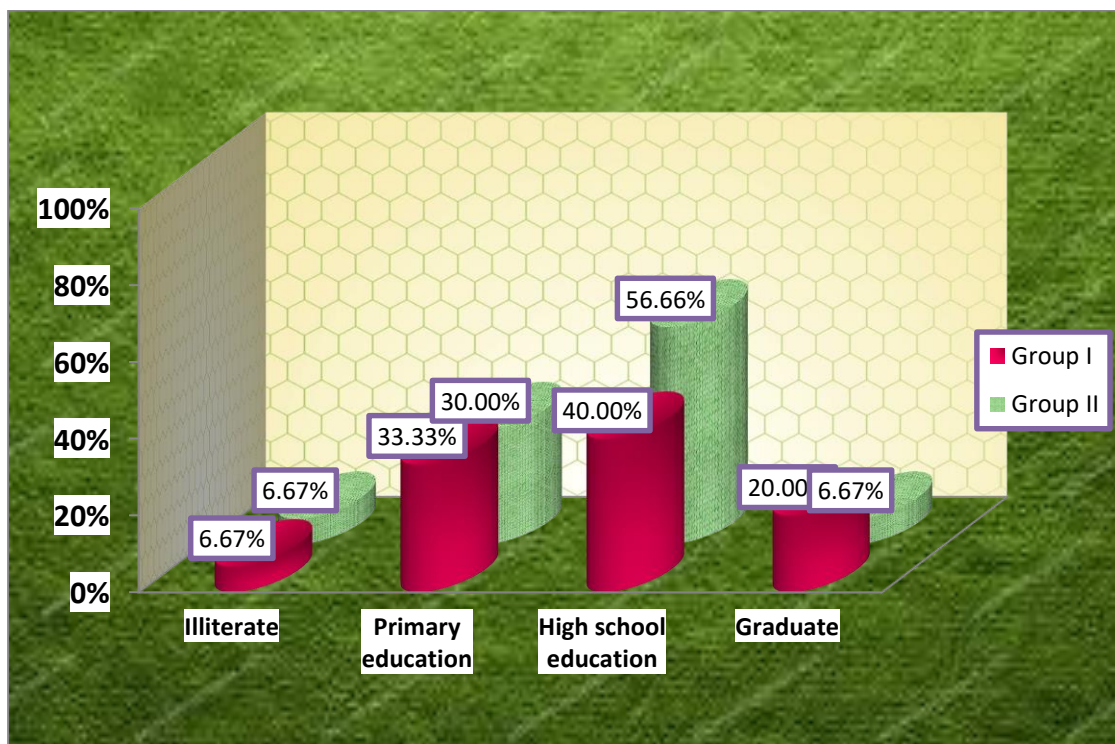


Figure 7: Multiple bar diagram shows the distribution of babies according to their mother's educational status.

In interventional group I, majority 12 (40.00%) were studied up to high school education, 10 (33.33%) were studied up to primary school education, 6 (20.00%) were studied up to graduates and 2 (6.67%) of them no formal education.

In group II, majority 17 (56.66%) were studied up to high school education, 9 (30.0%) were studied up to primary school education 2 (6.67%) were studied up to graduates and 2 (6.67%) of them no formal education.

Distribution of subjects according to father's occupational status

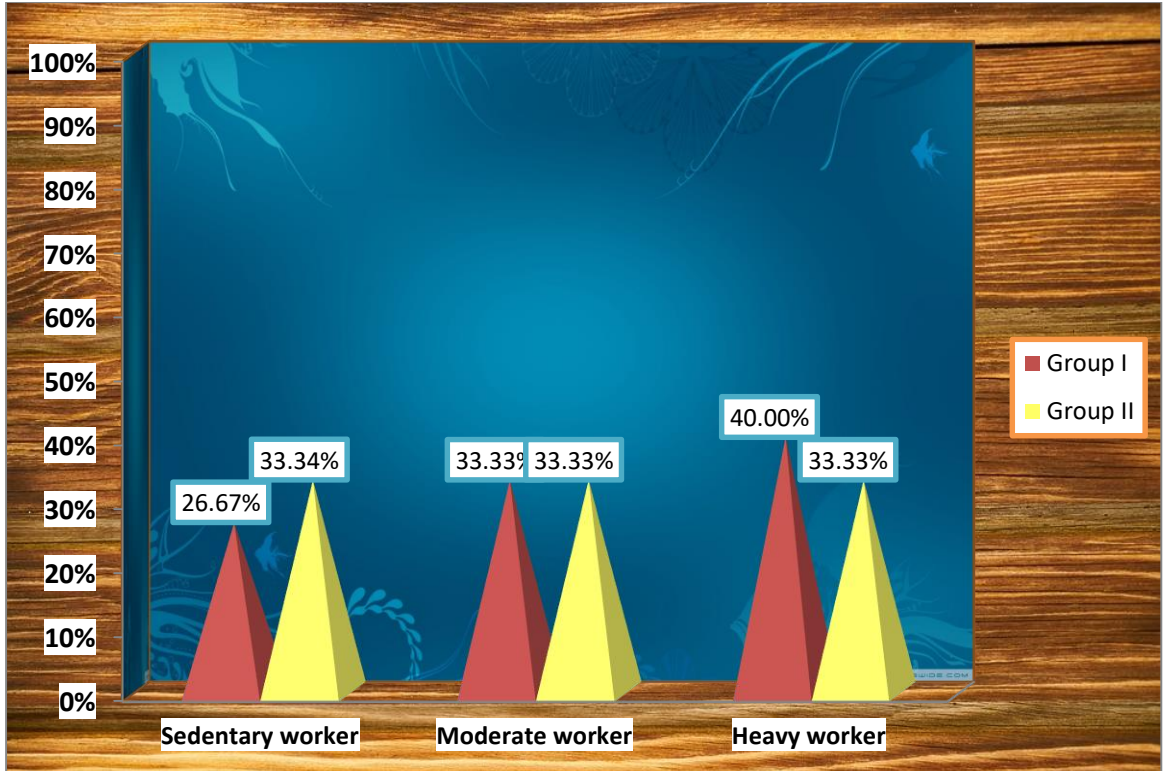


Figure 8: The pyramid diagram shows the distribution of babies according to their father's occupational status.

In interventional group I, majority 12 (40.00%) were heavy worker, 10 (33.33%) were moderate worker and remaining 8 (26.67%) were sedentary worker.

In interventional group II, majority 10 (33.34%) were sedentary worker, 10 (33.33 %) were moderate worker and remaining 10 (33.33%) were heavy worker.

Distribution of subjects according to their mother's occupational status

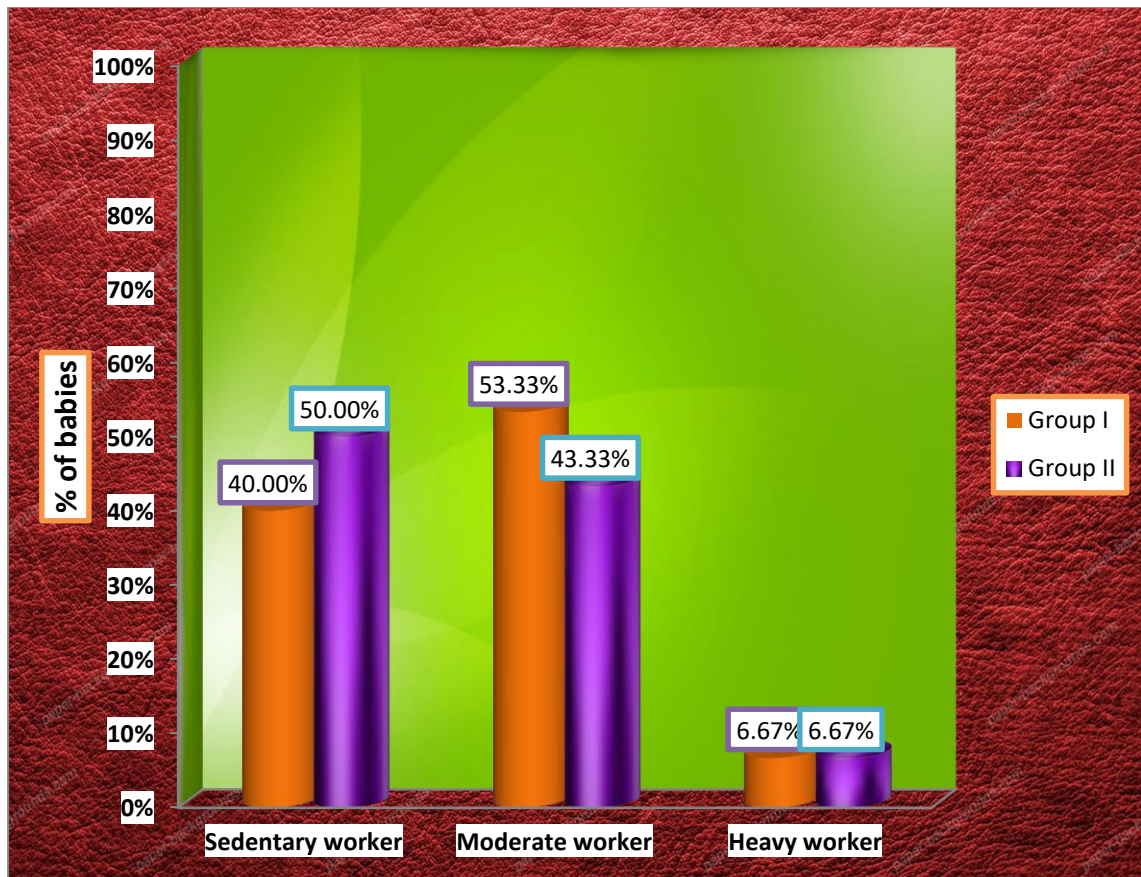


Figure 9: Cylinder diagram shows the distribution of babies according to their mother's occupational status.

In interventional group I, majority 16 (53.33%) were moderate worker, 12 (40.00%) were sedentary worker and remaining 2(6.67%) were heavy worker.

In interventional group II, majority 15 (50.00%) were sedentary worker, 13 (43.33 %) were moderate worker and remaining 2 (6.67%) were heavy worker.

Distribution of subjects according to their type of family

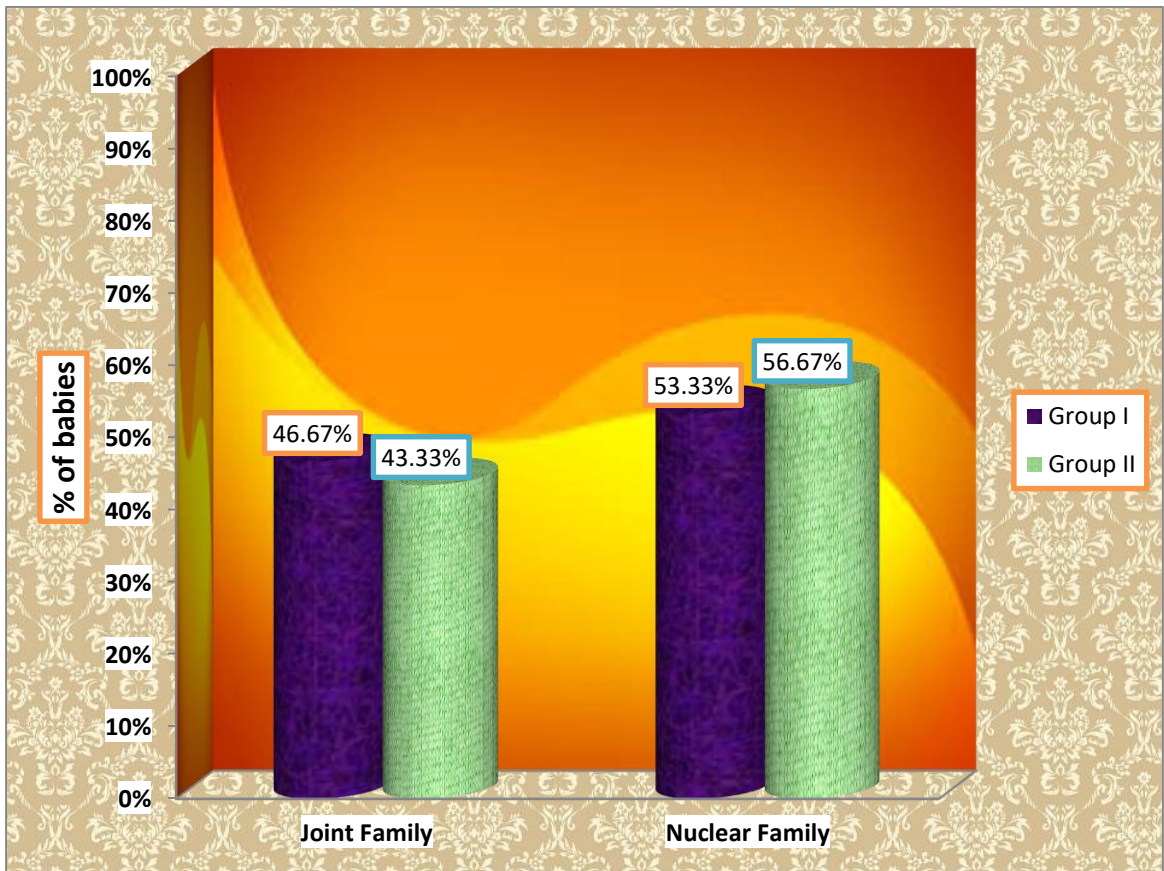


Figure 10: Cylinder diagram shows the distribution of babies according to their type of family.

In interventional group I, majority of the babies 16 (53.33%) were had nuclear family and remaining 14 (46.67%) were had joint family.

In group II, majority of the babies 17 (56.67%) were had nuclear family and remaining 13 (43.33%) were had joint family.

Distribution of the subjects according to their monthly family income

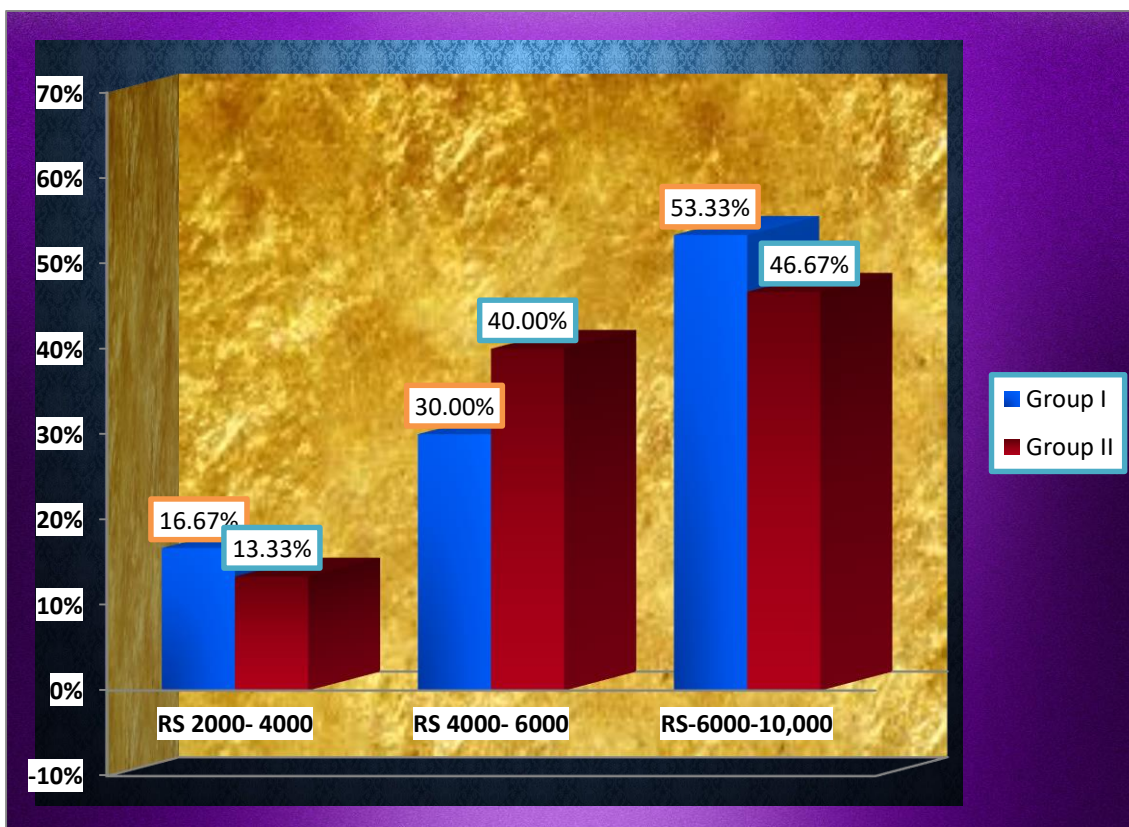


Figure 11: Multiple bar diagram shows the distribution of babies according to their monthly family income.

In interventional group I, majority 16 (53.33%) were earned between Rs. 6000-10,000, 9 (30.00%) were earned between Rs. 4000-6000, 5 (16.67%) were earned between Rs. 2000-4000.

In interventional group II, majority 14 (46.67%) were earned between Rs. 6000-10,000, 12 (40.00%) were earned between Rs. 4000-6000, 4 (13.33%) were earned between Rs 2000-4000.

Table 2: Frequency and percentage distribution of clinical variables among babies with hyperbilirubinemia.

n =60

Clinical variables		Group				χ^2
		Group I		Group II		
		f	%	f	%	
Birth weight	< 1.5 kg	11	36.67%	17	56.67%	$\chi^2=2.41$ P=0.11(NS)
	1.5 - 2.5kg	19	63.33%	13	43.33%	
	> 2.5 kg	0	0.00%	0	0.00%	
Passing meconium	adequate	14	46.67%	20	66.67%	$\chi^2=2.44$ P=0.12(NS)
	passed	16	53.33%	10	33.33%	
	Not adequate	0	0.00%	0	0.00%	
Crying pattern	High pitch cry	12	40.00%	18	60.00%	$\chi^2=2.40$ P=0.12(NS)
	Normal cry	18	60.00%	12	40.00%	
	Not crying	0	0.00%	0	0.00%	
Hydration status	Hydration	9	30.00%	15	50.00%	$\chi^2=4.07$ P=0.13(NS)
	Moderate hydration	11	36.67%	11	36.67%	
	Dehydration	10	33.33%	4	13.33%	
changing position	Half hourly	16	53.33%	15	50.00%	$\chi^2=0.51$ P=0.77(NS)
	Hourly	12	40.00%	14	46.67%	
	2 nd hourly	2	6.67%	1	3.33%	
Rh incompatibility	Negative	23	76.67%	20	66.67%	$\chi^2=0.73$ P=0.39(NS)
	Positive	7	23.33%	10	33.33%	
Blood group	A Group	9	30.00%	8	26.67%	$\chi^2=0.09$ P=0.99(NS)
	B Group	15	50.00%	16	53.33%	
	ABO Group	2	6.67%	2	6.67%	
	O Group	4	13.33%	4	13.33%	
Moulding of skull	Cephalo hematoma	0	0.00%	0	0.00%	$\chi^2=0.00$ P=1.00(NS)
	Caput succedaneum	0	0.00%	0	0.00%	
	Normal skull	30	100.00%	30	100.00%	

Table 3 explains the distribution of babies according to their clinical variables.

With stating the birth weight of the babies, in interventional group I majority 19 (63.33%) were between 1.5 – 2.5 kg, 11 (36.67%) were less than 1.5 kg. none of them were more than 2.5 kg. In interventional group II majority 17 (56.67) less than 1.5 kg, 13 (43.33) were between 1.5 -2.5 kg none of them were more than 2.5 kg.

While considering the passing meconium of the baby, in interventional group 1, majority of the babies 16 (53.33%) were passed meconium, 14 (46.67%) were adequately passed and none of them were not adequately passed meconium. In Interventional group II, majority 20 (66.67%) were adequately passed meconium, 10 (33.33%) were passed meconium and none of them were not passed adequately.

While considering the crying pattern of the baby, in interventional group I, majority 18 (60.00%) were had high pitch cry, 12 (40.00%) were had normal cry and none of them were not crying. In interventional group II, majority of the babies 18 (60.00%) were had high pitch cry, 12(40.00%) were had normal cry and none of them were not crying.

While considering the hydration status, in interventional group I, majority of the babies 11 (36.67%) were had moderate hydration, 10 (33.33%) were had dehydration and 9 (30.00%) were had hydration. In group II, majority of the babies 15 (50.00) were had hydration, 11 (36.67) were had moderate hydration and 4 (13.33%) were had dehydration.

While considering the babies changing position, in interventional group I, majority of the babies 16 (53.33%) were changed half hourly, 12 (40.005) were changed hourly and remaining 2 (6.67%) were changed every 2nd hourly. In interventional group II, majority of the babies 15 (50.005) were

changed half hourly, 14 (46.67%) were changed hourly and 1(3.33%) were changed every 2ndhourly.

While considering the Rh incompatibility, in interventional group I, majority 23 (76.675) were Rh negative mother, 7 (23.335) were Rh positive mother. In interventional group II, majority of the babies 20(66.69%) were negative mother, 10 (33.33%) were positive mother.

According to Blood Group, in interventional group I, majority of the babies 15 (50.00%) were 'B' group, 9 (30.00%) were 'A' group, 4 (13.33%) were 'O' group and remaining 2 (6.67%) were ABO group. In interventional group II, majority of the babies 16 (53.33%) were 'B' group, 8 (26.67%) were 'A' group 2 (6.67%) were ABO group remaining 4 (13.33%) were 'O' group.

According to moulding of the skull, in interventional group I, majority of the babies 30 (100.00%) were had normal moulding of the skull none of them had Caput succedaneum or cephalohematoma. In interventional group II, majority of the babies 30 (100.00%) were had normal moulding of the skull and none of them were had caput succedaneum or cephalohematoma.

Distribution of the subjects according to their birth weight

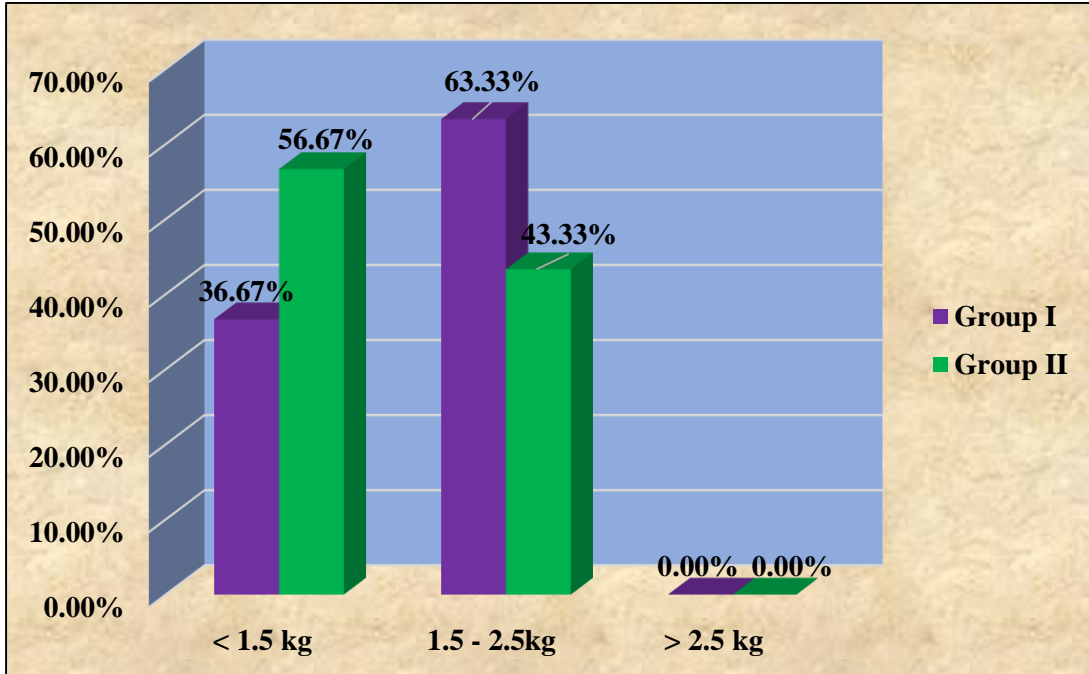


Figure 12: Cylindrical diagram shows the distribution of babies according to their birth weight in interventional group I and group II

In interventional group I majority 19 (63.33%) were between 1.5 – 2.5 kg, 11 (36.67%) were less than 1.5 kg. none of them were more than 2.5 kg.

In interventional group II majority 17 (56.67) less than 1.5 kg, 13 (43.33) were between 1.5 -2.5 kg none of them were more than 2.5 kg.

Distribution of subjects according to their passing of meconium

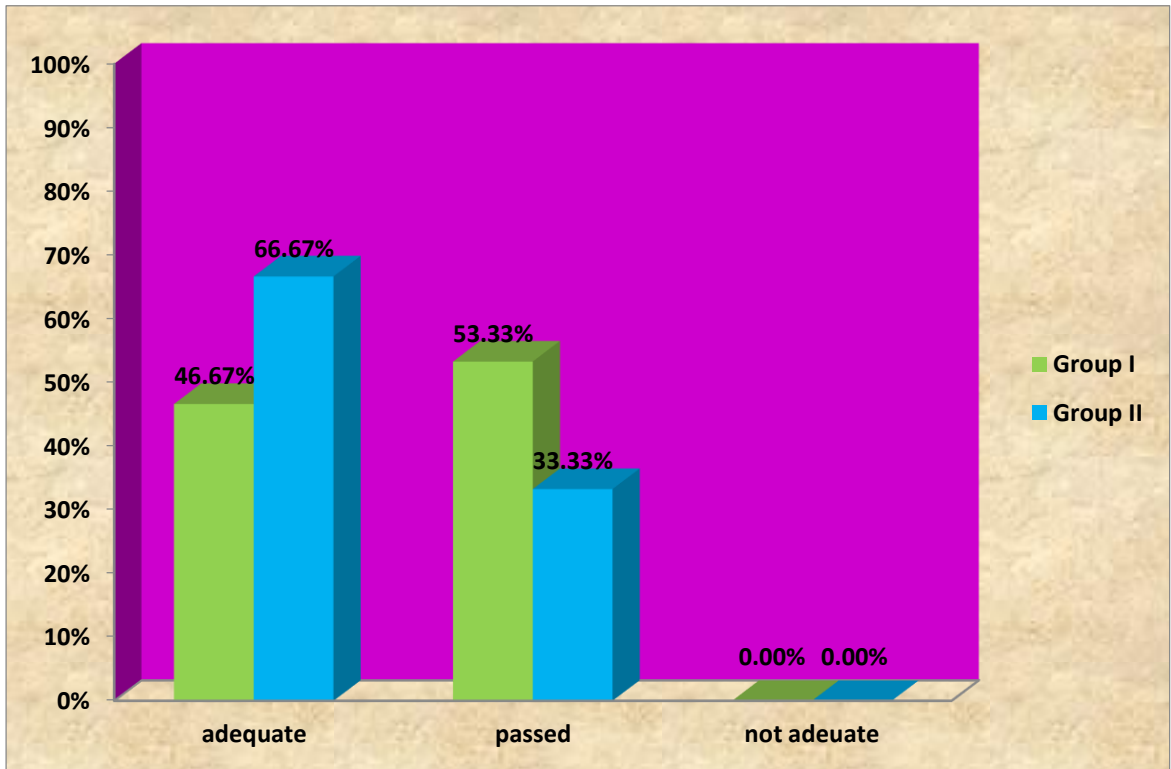


Figure 13: the bar diagram shows the distribution of babies according to their passing of meconium.

In interventional group 1, majority of the babies 16 (53.33%) were passed meconium, 14 (46.67%) were adequately passed and none of them were not adequately passed meconium.

In Interventional group II, majority 20 (66.67%) were adequately passed meconium, 10 (33.33%) were passed meconium and none of them were not passed adequately.

Distribution of the subjects according to hydration status

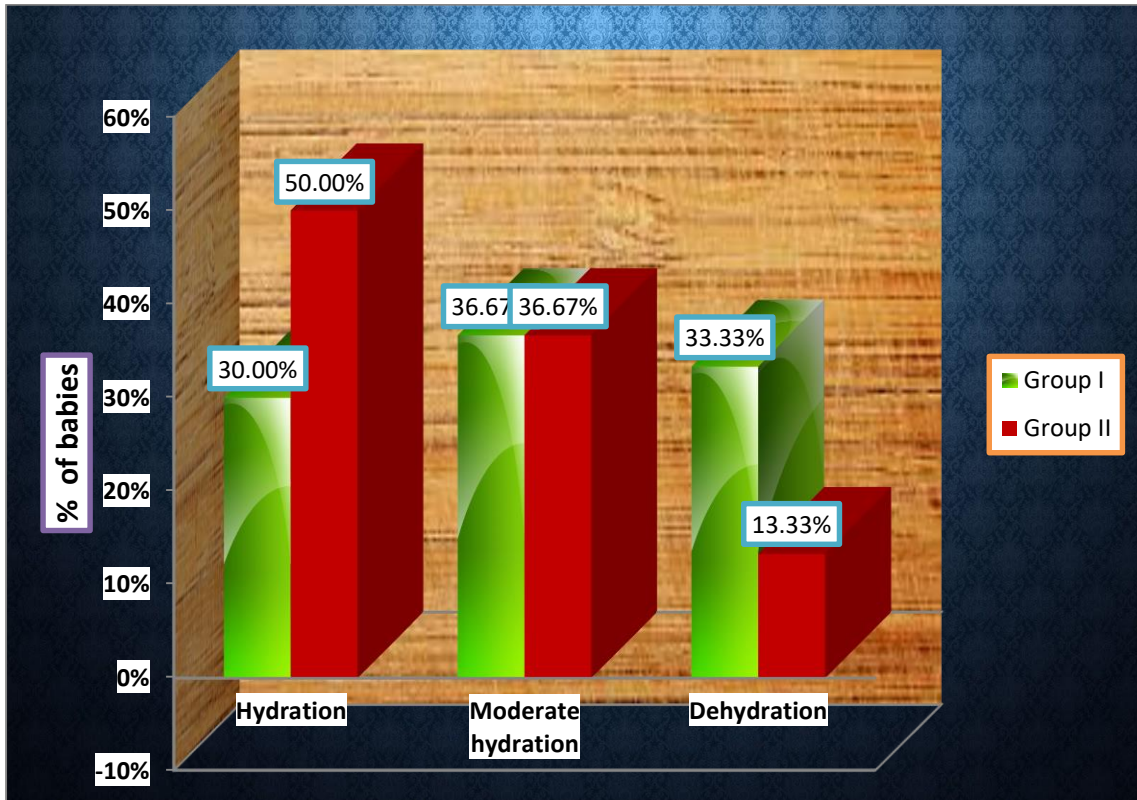


Figure 14: Multiple bar diagram shows the distribution of babies according to their hydration status.

In interventional group I majority of the babies 11 (36.67%) were had moderate hydration, 10 (33.33%) were had dehydration and 9 (30.00%) were had hydration.

In group II, majority of the babies 15(50.00) were had hydration, 11(36.67) were had moderate hydration and 4 (13.33%) were had dehydration.

Table 3: Frequency and percentage distribution of pre test level of bilirubin among babies with hyperbilirubinemia in Group I and group II

	Group				χ^2
	Group I		Group II		
	n	%	n	%	
Normal	0	0.00%	0	0.00%	$\chi^2=0.73$ P=0.69(NS)
Mild	3	10.00%	3	10.00%	
Moderate	19	63.33%	16	53.33%	
Severe	8	26.67%	11	36.67%	
Total	30	100.0%	30	100.0%	

The above table 3 shows that distribution of the pre test level of bilirubin among babies in Group I and group II

In interventional group I, majority of the babies 19 (63.33%) were had moderate level of bilirubin, 8 (26.67%) were had severe level, and 3 (10.00%) were had mild level and none of them were had normal level, whereas in group II, majority of the babies 16 (53.33%) were had moderate level of bilirubin, 11 (36.67%) were had severe level, 3 (10.00%) were had mild level and none of them were had normal level. Statistically there is no significant difference in the pre test level of bilirubin among babies in group I and group II. It was confirmed by using chi square test.

Pre test level of bilirubin among babies with hyperbilirubinemia

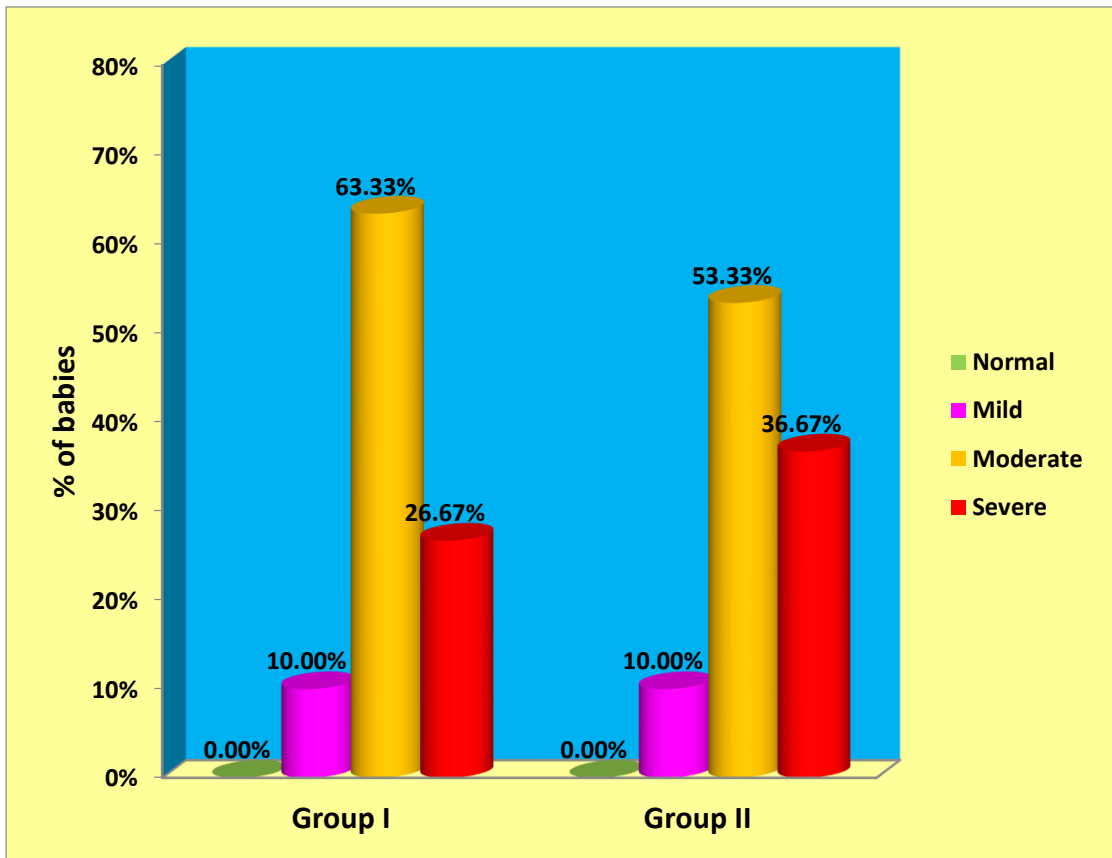


Figure: 15 Cylindrical diagram compares the pre test level of bilirubin among babies with hyperbilirubinemia in group I and Group II

The above figure portrays distribution of the pre test level of bilirubin among babies in Group I and group II.

In interventional group I, majority of the babies 19 (63.33%) were had moderate level of bilirubin, 8 (26.67%) were had severe level and 3 (10.00%) were had mild level and none of them were had normal level, whereas in group II majority of the babies 16 (53.33%) were had moderate level of bilirubin, 11 (36.67%) were had severe level, 3 (10.00%) were had mild level and none of them were had normal level. Statistically there is no significant difference in the pre test level of hyperbilirubinemia among babies in group I and group II. It was confirmed by using chi square test.

Section II

Description of pre test and post test level of bilirubin among babies with hyperbilirubinemia in Group I

Table 4

Pre test and post test level of bilirubin among babies with hyperbilirubinemia in Group I.

n=30

Level of bilirubin Score	Group I				χ^2
	Pre test		Post test		
	f	%	f	%	
Normal	0	0.00%	0	0.00%	$\chi^2=0.73$ P=0.69(NS)
Mild	3	10.00%	3	10.00%	
Moderate	19	63.33%	16	53.33%	
Severe	8	26.67%	11	36.67%	
Total	30	100.0%	30	100.0%	

The above table 4 explains the pre test and post test level of bilirubin among babies with hyperbilirubinemia in Group I.

While comparing the pre test, majority 19 (63.33%) were had moderate level, 8 (26.67%) were had severe level and 3 (10.00%) were had mild level and none of them were had normal level. In the post test, majority of the babies 16 (53.33%) were had moderate level of bilirubin, 11 (36.67%) were had severe level, 3 (10.00%) were had mild level and none of them were had normal level. The Chi square test was used to find out the difference between the pre test and post test level of bilirubin $\chi^2=0.73$ which was greater than table value at 0.01 level.

Section III

Description of pre test and post test level of bilirubin among babies with hyperbilirubinemia in Group II.

Table 5

pre test and post test level of bilirubin among babies in the interventional Group II.

	Group II				χ^2
	Pre test		Post test		
	f	%	f	%	
Normal	0	0.00%	0	0.00%	$\chi^2=10.38$ P=0.01**(S)
Mild	3	10.00%	9	30.00%	
Moderate	16	53.33%	21	70.00%	
Severe	11	36.67%	0	0.00%	
Total	30	100.0%	30	100.0%	

The above table 5 explains the pre test and post test level of bilirubin among Group II.

In the pre test, 16 (53.33%) were had moderate level, 11 (36.67%) were had severe level and 3 (10.00%) were had mild level and none of them were had normal level. In the post test, majority of the babies 21 (70.00%) were had moderate level of bilirubin, 9 (30.00%) were had mild level and none of them were had normal or severe level. The Chi square test was used to find out the difference between the pre test and post test level of bilirubin $\chi^2=10.38$ which was greater than table value at 0.01 level.

Section IV

Comparison of pre test and post test level of bilirubin among babies with hyperbilirubinemia in group I and group II

Table 6

Comparison of mean score of bilirubin among babies with hyperbilirubinemia in group I and group II

n=60

	Group	N	Mean	Std. Deviation	Mean Difference	Student independent t-test
Pre-test	Group I	30	13.13	2.62	0.27	t=0.32 P=0.74 (NS)
	Group II	30	13.40	3.64		
Post-test	Group I	30	8.80	2.56	2.03	t=3.20 P=0.01** (S)
	Group II	30	10.83	2.35		

The above table 6 portrays the mean score of bilirubin between pre test and post test among babies in group I and group II

In interventional group I, the pre test mean score was 13.13 with SD 2.62 whereas in group II, pre test mean score was 13.40 with SD 3.64 and the mean difference was 0.27 and calculated 't' value 0.32 which is not significant.

In interventional group II, in the post test mean score was 8.80 with SD 2.56 whereas in group II, the post test mean score was 10.83 with SD 2.35 and the mean difference was 2.03 and calculated 't' value 3.20 which was higher than table value at 0.001 level.

Comparison of mean score of bilirubin in group I and group II.

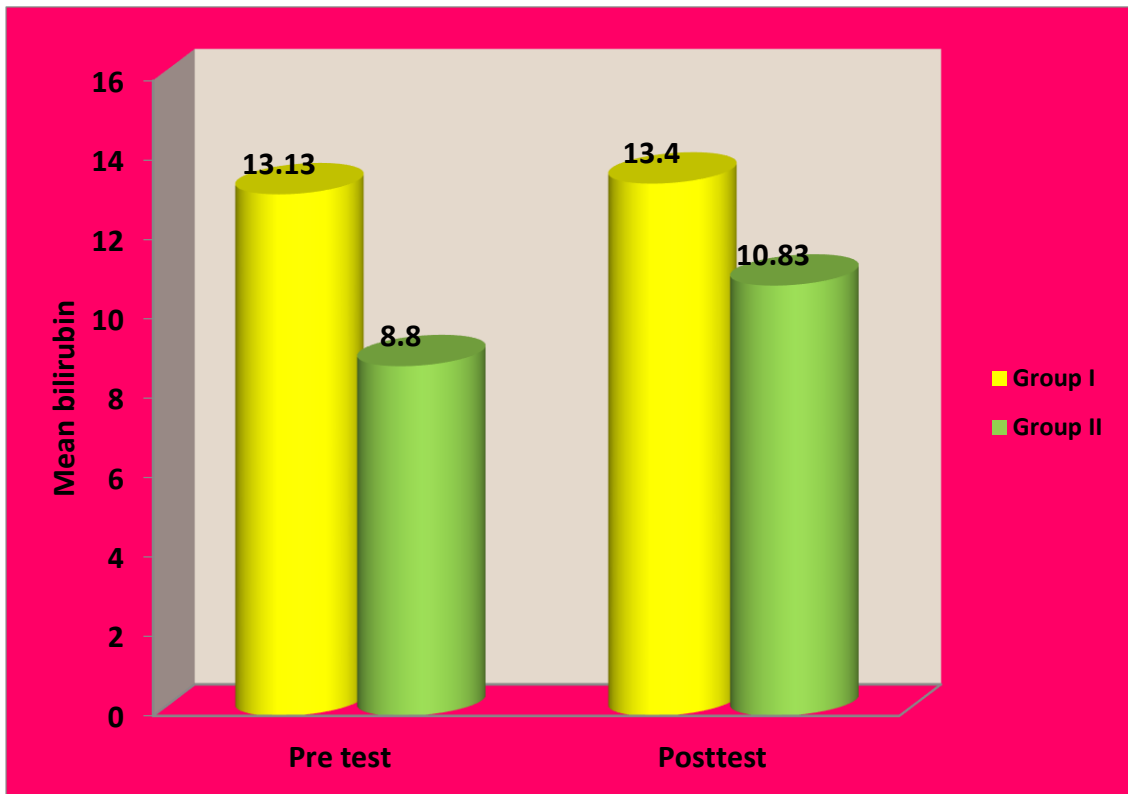


Figure 16: cylindrical diagram portrays the mean score of bilirubin between pre test and post test among babies in group I and group II

In interventional group I, in pre test mean score was 13.13 with SD 2.62 whereas in group II, pre test mean score was 13.40 with SD 3.64 and the mean difference was 0.27 and calculated 't' value 0.32 which is not significant.

In interventional group II, in the post test mean score was 8.80 with SD 2.56 whereas in group II, the post test mean score was 10.83 with SD 2.35 and the mean difference was 2.03 and calculated 't' value 3.20 which was higher than table value at 0.001 level.

Table: 7 Effectiveness of continuous (Group I) and intermittent phototherapy (Group II) among babies with hyperbilirubinemia

n=60

	Group	n	Mean	Standard. Deviation	Mean Difference from baseline	% of reduction mean score
Group I	Pre-test	30	13.13	2.62	4.33	32.97%
	Post test	30	8.80	2.56		
Group II	Pre-test	30	13.40	3.64	2.56	19.10%
	Post-test	30	10.83	2.35		

The above table 7 portrays effectiveness of continuous (Group I) and intermittent phototherapy (Group II) among babies with hyperbilirubinemia

In Group I, the pre test mean score was 13.13 with SD 2.62, whereas the post test mean score was 8.80 with SD 2.56 and the mean difference was 4.33(32.97%)of mean reduction score)

In Group II, the pre test mean score was 13.40 with SD 3.64, whereas the post test mean score was 10.83 with SD 2.35 and the mean difference was 2.56 (19.10% of mean reduction score)

On an average, babies with hyperbilirubinemia interventional group I (continuous phototherapy) were had 32.97% more reduction score in hyperbilirubinemia, whereas in group II babies were had 19.10% reduction score in hyperbilirubinemia. This study results shows intermittent phototherapy was more effective than continuous phototherapy.

The difference shows the intermittent phototherapy was more effective in reducing the level of bilirubin among babies with hyperbilirubinemia.

Effectiveness of continuous (Group I) and intermittent phototherapy (Group II) among babies with hyperbilirubinemia.

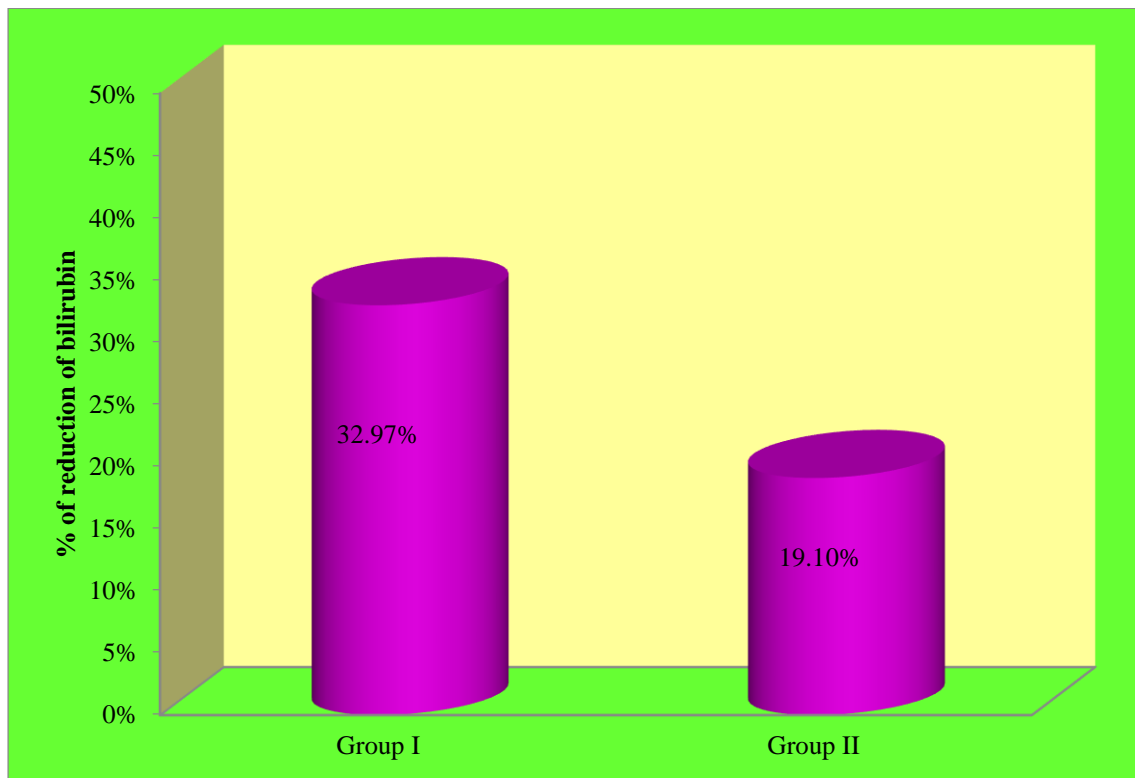


Figure 17: Cylindrical diagram shows the proportion percentage of level of bilirubin among interventional group I and group II.

On an average, babies with hyperbilirubinemia in the interventional group I (continuous phototherapy) was reduced to 32.97% and in interventional group II (intermittent phototherapy) was reduced to 19.10%.

The difference shows the intermittent phototherapy was more effective in reducing the level of bilirubin among babies with hyperbilirubinemia

Section V

Describes association between the post test level of bilirubin among babies with hyperbilirubinemia in group I with their selected socio demographic variables

Table 8

Association between the post test level of bilirubin among babies with their selected socio demographic variables in group I

Socio demographic variables		Post-test level of bilirubin						n	χ^2
		Mild		Moderate		Severe			
		f	%	f	%	f	%		
Age	1-15 days	18	60.0%	12	40.0%	0	0.0%	30	$\chi^2=0.00$
	15-28 days	0	0.0%	0	0.0%	0	0.0%	0	P=1.00(NS)
Sex	Male child	8	47.1%	9	52.9%	0	0.0%	17	$\chi^2=2.73$
	Female child	10	76.9%	3	23.1%	0	0.0%	13	P=0.10(NS)
Religion	Hindu	10	45.5%	12	54.5%	0	0.0%	22	$\chi^2=2.73$ P=0.10(NS)
	Christian	5	100.0%	0	0.0%	0	0.0%	5	
	Muslim	3	100.0%	0	0.0%	0	0.0%	3	
Place of Domicile	Urban	8	57.1%	6	42.9%	0	0.0%	14	$\chi^2=0.10$
	Rural	10	62.5%	6	37.5%	0	0.0%	16	P=0.79(NS)
Education of Father	No formal	1	33.3%	2	66.7%	0	0.0%	3	$\chi^2=1.55$ P=0.67(NS)
	Primary education	6	54.5%	5	45.5%	0	0.0%	11	
	High school education	7	70.0%	3	30.0%	0	0.0%	10	
	Graduate	4	66.7%	2	33.3%	0	0.0%	6	
Education of Mother	No formal	2	100.0%	0	0.0%	0	0.0%	2	$\chi^2=1.94$ P=0.58(NS)
	Primary education	6	60.0%	4	40.0%	0	0.0%	10	
	High school education	6	50.0%	6	50.0%	0	0.0%	12	
	Graduate	4	66.7%	2	33.3%	0	0.0%	6	
Occupation of Father	Sedentary worker	4	50.0%	4	50.0%	0	0.0%	8	$\chi^2=1.87$ P=0.39(NS)
	Moderate worker	5	50.0%	5	50.0%	0	0.0%	10	
	Heavy worker	9	75.0%	3	25.0%	0	0.0%	12	

Occupation of Mother	Sedentary worker	10	83.3%	2	16.7%	0	0.0%	12	$\chi^2=6.38$ P=0.05*(S)
	Moderate worker	8	50.0%	8	50.0%	0	0.0%	16	
	Heavy worker	0	0.0%	2	100.0%	0	0.0%	2	
Type of family	Joint Family	7	50.0%	7	50.0%	0	0.0%	14	$\chi^2=1.09$ P=0.30(NS)
	Nuclear Family	11	68.8%	5	31.3%	0	0.0%	16	
Monthly Family income	Rs.2000- 4000	18	60.0%	12	40.0%	0	0.0%	5	$\chi^2=1.00$ P=0.61(NS)
	Rs.4000- 6000	0	0.0%	0	0.0%	0	0.0%	9	
	Rs.6000-10,000	8	47.1%	9	52.9%	0	0.0%	16	

The above table 8 shows association between post test level of bilirubin among the babies with hyperbilirubinemia in group I with their selected socio demographic variables.

In order to find out the association between the post test level of bilirubin in interventional group I with their selected socio demographic variables. Chi square analysis was done. As indicated among the babies undergoing continuous phototherapy in the post test, there was a significant association between the level of bilirubin and their selected socio demographic variables such as sedentary mother's babies ($\chi^2=6.38$ P=0.05) were had more reduced bilirubin score than others. Other variables was not significantly associated.

Table 9: Association between the post test level of bilirubin among babies with their clinical variables in group I.

Clinical variables		Post test level of bilirubin						n	χ^2
		Mild		Moderate		Severe			
		f	%	f	%	f	%		
Birth weight	< 1.5 kg	10	90.9%	1	9.1%	0	0.0%	11	$\chi^2=6.91$ P=0.01**(S)
	1.5- 2.5 kg	8	42.1%	11	57.9%	0	0.0%		
	> 2.5 kg	0	0.0%	0	0.0%	0	0.0%		
passing meconium	Adequate	12	85.7%	2	14.3%	0	0.0%	14	$\chi^2=7.23$ P=0.01** (S)
	Passed	6	37.5%	10	62.5%	0	0.0%		
	Not adequate	0	0.0%	0	0.0%	0	0.0%		
Crying pattern	High pitch cry	10	83.3%	2	16.7%	0	0.0%	12	$\chi^2=4.53$ P=0.02* (S)
	Normal cry	8	44.4%	10	55.6%	0	0.0%		
	Not crying	0	0.0%	0	0.0%	0	0.0%		
Hydration status	Hydration	7	77.8%	2	22.2%	0	0.0%	9	$\chi^2=2.15$ P=0.34 (NS)
	Moderate hydration	5	45.5%	6	54.5%	0	0.0%		
	Dehydration	6	60.0%	4	40.0%	0	0.0%		
changing position	Half hourly	8	50.0%	8	50.0%	0	0.0%	16	$\chi^2=2.22$ P=0.33 (NS)
	Hourly	8	66.7%	4	33.3%	0	0.0%		
	2 nd hourly	2	100.0%	0	0.0%	0	0.0%		
Rh incompatibility	Negative	13	56.5%	10	43.5%	0	0.0%	23	$\chi^2=0.49$ P=0.48 (NS)
	Positive	5	71.4%	2	28.6%	0	0.0%		
Blood group	A Group	4	44.5%	5	55.5%	0	0.0%	9	$\chi^2=2.68$ P=0.44(NS)
	B Group	10	66.7%	5	33.3%	0	0.0%		
	ABO Group	2	100.0%	0	0.0%	0	0.0%		
	O Group	2	50.0%	2	50.0%	0	0.0%		
Moulding of skull	cephal hematoma	0	0.0%	0	0.0%	0	0.0%	0	$\chi^2=0.00$ P=1.00 (NS)
	Caput succedaneum	0	0.0%	0	0.0%	0	0.0%		
	Normal skull	18	60.0%	12	40.0%	0	0.0%		

The above table 9 shows association between post test level of bilirubin among babies with hyperbilirubinemia in group I with their clinical variables.

In order to find out the association between the post test level of bilirubin in group I with their clinical variables. Chi square analysis was done. As indicated among the babies on continuous phototherapy in the post test there was a significant association between the level of bilirubin among babies with hyperbilirubinemia and their clinical variables such as less than 1.5 kg birth weight babies ($\chi^2=6.91$ **P=0.01**), passed meconium adequately ($\chi^2=7.23$ **P=0.01**) with normal crying pattern ($\chi^2=4.53$ **P=0.02**) were had more reduced score than others. Other variable was not significantly associated.

Table: 10 Association between the post test level of bilirubin among babies with their selected socio demographic variables in group II

n=30

Socio demographic variables		Post-test level of bilirubin						n	χ^2
		Mild		Moderate		Severe			
		f	%	f	%	f	%		
Age	1-15 days	9	30.0%	21	70.0%	0	0.0%	30	$\chi^2=0.00$ P=1.00(NS)
	15-28 days	0	0.0%	0	0.0%	0	0.0%	0	
Sex	Male child	5	25.0%	15	75.0%	0	0.0%	20	$\chi^2=0.71$ P=0.39(NS)
	Female child	4	40.0%	6	60.0%	0	0.0%	10	
Religion	Hindu	4	20.0%	16	80.0%	0	0.0%	20	$\chi^2=3.42$ P=0.18(NS)
	Christian	3	42.9%	4	57.1%	0	0.0%	7	
	Muslim	2	66.7%	1	33.3%	0	0.0%	3	
	Others	0	0.0%	0	0.0%	0	0.0%	0	
Place of Domicile	Urban	5	41.7%	7	58.3%	0	0.0%	12	$\chi^2=1.29$ P=0.25(NS)
	Rural	4	22.2%	14	77.8%	0	0.0%	18	
Education of Father	Illiterate	0	0.0%	3	100.0%	0	0.0%	3	$\chi^2=5.64$ P=0.13(NS)
	Primary education	2	20.0%	8	80.0%	0	0.0%	10	
	High school education	3	27.3%	8	72.7%	0	0.0%	11	
	Graduate	4	66.7%	2	33.3%	0	0.0%	6	
Education of Mother	No formal	0	0.0%	2	100.0%	0	0.0%	2	$\chi^2=5.91$ p=0.11(NS)
	Primary education	3	33.3%	6	66.7%	0	0.0%	9	
	High school education	4	23.5%	13	76.5%	0	0.0%	17	
	Graduate	2	100.0%	0	0.0%	0	0.0%	2	
Occupation of Father	Sedentary worker	3	30.0%	7	70.0%	0	0.0%	10	$\chi^2=0.95$ p=0.61(NS)
	Moderate worker	2	20.0%	8	80.0%	0	0.0%	10	
	Heavy worker	4	40.0%	6	60.0%	0	0.0%	10	
Occupation of Mother	Sedentary worker	8	53.3%	7	46.7%	0	0.0%	15	$\chi^2=7.82$ p=0.02*(S)
	Moderate worker	1	7.7%	12	92.3%	0	0.0%	13	
	Heavy worker	0	0.0%	2	100.0%	0	0.0%	2	

Type of family	Joint Family	4	30.8%	9	69.2%	0	0.0%	13	$\chi^2=0.01$ p=0.93(NS)
	Nuclear Family	5	29.4%	12	70.6%	0	0.0%	17	
Monthly Family income	RS 2000- 4000	9	30.0%	21	70.0%	0	0.0%	4	$\chi^2=4.49$ p=0.10(NS)
	RS 4000- 6000	0	0.0%	0	0.0%	0	0.0%	12	
	RS-6000-10,000	5	25.0%	15	75.0%	0	0.0%	14	

The above table 10 shows association between post test level of bilirubin among babies with hyperbilirubine miain group II with their selected socio demographic variables.

In order to find out the association between the post test level of bilirubin in interventional group II with their selected socio demographic variables, Chi square analysis was done. As indicated among the babies undergoing Intermittent phototherapy, in the post test there was a significant association between the level of bilirubin and their selected socio demographic variables such as sedentary mother's babies, ($\chi^2=4.47$ $P=0.03$) were had more reduced bilirubin score than others. Other variable was not significantly associated.

Table 11: Association between the post test level of bilirubin among babies with hyperbilirubinemia and their clinical variables in group II

Clinical variables		Post-test level of bilirubin						n	$\chi^2=$
		Mild		Moderate		Severe			
		f	%	f	%	f	%		
Birth weight	<1.5 kg	8	47.1%	9	52.9%	0	0.0%	17	$\chi^2=4.52$ P=0.03* (S)
	1.5-2.5 kg	1	7.7%	12	92.3%	0	0.0%	13	
	>2.5 kg	0	0.0%	0	0.0%	0	0.0%	0	
passing meconium	adequate	9	45.0%	11	55.0%	0	0.0%	20	$\chi^2=9.42$ P=0.01** (S)
	passed	0	0.0%	10	100.0%	0	0.0%	10	
	Not adequate	0	0.0%	0	0.0%	0	0.0%	0	
Crying pattern	High pitch cry	8	44.4%	10	55.6%	0	0.0%	18	$\chi^2=4.47$ P=0.03* (S)
	Normal crying	1	8.3%	11	91.7%	0	0.0%	12	
	Not crying	0	0.0%	0	0.0%	0	0.0%	0	
Hydration status	Hydration	7	46.7%	8	53.3%	0	0.0%	15	$\chi^2=4.43$ P=0.10 (NS)
	Moderate hydration	2	18.2%	9	81.8%	0	0.0%	11	
	Dehydration	0	0.0%	4	100.0%	0	0.0%	4	
changing position	Half hourly	2	13.3%	13	86.7%	0	0.0%	15	$\chi^2=5.08$ P=0.07 (NS)
	Hourly	7	50.0%	7	50.0%	0	0.0%	14	
	2 nd hourly	0	0.0%	1	100.0%	0	0.0%	1	
Rh incompatibility	Negative	5	25.0%	15	75.0%	0	0.0%	20	$\chi^2=0.71$ P=0.39 (NS)
	Positive	4	40.0%	6	60.0%	0	0.0%	10	
Blood group	A Group	2	25.0%	6	75.0%	0	0.0%	8	$\chi^2=1.72$ P=0.63 (NS)
	B Group	5	31.3%	11	68.8%	0	0.0%	16	
	ABO Group	0	0.0%	2	100.0%	0	0.0%	2	
	O Group	2	50.0%	2	50.0%	0	0.0%	4	
Moulding of skull	cephal hematoma	0	0.0%	0	0.0%	0	0.0%	0	$\chi^2=0.00$ P=1.00 (NS)
	Caput succedaneum	0	0.0%	0	0.0%	0	0.0%	0	
	Normal skull	9	30.0%	21	70.0%	0	0.0%	30	

The above table11 shows association between post test level of bilirubin among with babies with hyperbilirubinemia in group II with their clinical variables.

In order to find out the association between the post test level of bilirubin in interventional group II with their clinical variables, Chi square analysis was done. As indicated among the babies on undergoing intermittent phototherapy, in the post test there was a significant association between the level of bilirubin and their clinical variables such as babies more than 2.5kg birth weight ($\chi^2=4.52$ **P=0.03**) and passed meconium adequately ($\chi^2=9.42$ **P=0.01**) with high pitch cry ($\chi^2=4.47$ **P=0.03**) were had more reduced score in bilirubin level than others. Other variable was not significantly associated.

DISCUSSION

CHAPTER – V

DISCUSSION

This chapter deals with detailed discussion of the results of the data interpreted from the statistical analysis. The present study was focused to evaluate the effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at Government Rajaji Hospital, Madurai

The effort of this study was to evaluate the effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia. 60 samples were selected by probability (simple random) sampling technique. The level of bilirubin was assessed by Adopted Kramer's scale.

Objectives of the study were

- ❖ To assess the level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai.
- ❖ To evaluate the effectiveness of continuous phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I
- ❖ To evaluate the effectiveness of intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group II.
- ❖ To compare the effectiveness between continuous and intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I and group II.
- ❖ To associate the level of bilirubin among babies with hyperbilirubinemia and their selected socio demographic and clinical variables.

The following hypothesis tested were at 0.05 level of significance

H₁: There is a significant difference between the pre test and post test level of bilirubin among babies with hyperbilirubinemia in group I.

H₂: There is a significant difference between pre test and post test level of bilirubin among babies with hyperbilirubinemia in group II.

H₃: There is a significance difference between post test level of bilirubin among babies with hyperbilirubinemia in group I (continuous phototherapy) and group II (Intermittent phototherapy).

H₄: There is a significant association between the level of bilirubin among babies with hyperbilirubinemia in group I and group II with their selected socio demographic and clinical variables.

The findings of the study were discussed under the following headings

- ❖ Distribution of Socio demographic and clinical variables among babies with hyperbilirubinemia in interventional group I and group II.
- ❖ Description of pre test and post level of bilirubin among babies With hyperbilirubinemia in Interventional group I
- ❖ Description of pre test and post level of bilirubin among babies With hyperbilirubinemia in Interventional group I and group II
- ❖ Comparison of post test level of bilirubin among interventional group I and group II
- ❖ Association between post test level of bilirubin among babies in Interventional Group I and Group II with their selected socio demographic and clinical variables.

Jaundice is one of the most common conditions requiring medical attention in newborn babies. Approximately 60% of term and 80 % of term and 80% of preterm babies develop jaundice in the first week of life, and about 10% of breastfed babies are still jaundiced at 1 month of age. Phototherapy is the treatment with light. It is used in some cases of newborn jaundice to lower the bilirubin levels in baby's blood through a process called photo oxidation. In England photo therapy for neonatal hyperbilirubinemia was 140 neonates used in clinical practice. The

mechanism were identified by chemists, bio chemists, and pediatricians. The mechanism for bile excretion of unconjugated bilirubin was verified based on geometric configurational photoisomers finally the reaction and excretion of structural bilirubin photoisomers was proved to be main mechanism for the decrease in serum bilirubin during phototherapy for neonatal hyperbilirubinemia.

5.1 Discussion based on the socio demographic variables and clinical variables among babies in neonatal intensive care units.

Major findings of the study

- ❖ According to the age group, majority of the babies 30 (100 %) belongs to the age group between 1-15 days and none of them belongs to the age group between the age of 15 -28 days, both in interventional group I and group II.
- ❖ With regard to the gender, in interventional group I majority of the babies 17 (56.67%) were males whereas, majority in interventional group II 20 (66.67%) were males.
- ❖ Based on the religion, in interventional group I majority of the babies 22 (73.33 %) were Hindu, whereas in interventional group II majority of the subjects 20 (66.67%) were Hindu.
- ❖ With regard to place of domicile, in interventional group I, majority of the subjects 16 (53.33%) were hailed from rural area, where as in interventional group II, majority of the babies 18 (60.00 %) were hailed from rural area.
- ❖ On the basis of the education of father, in interventional group I majority 11 (36.67%) were studied up to primary education, whereas in interventional group II majority 11(36.67/%) were studied up to high school education.
- ❖ On the basis of education of mother, in interventional group I majority 12 (40.00%) were studied up to high school education, whereas in interventional group II majority 17 (56.66%) were studied up to high school education.

- ❖ In the view of occupation of fathers, in interventional group I majority 12 (40.00%) were heavy worker, whereas in interventional group II majority 10 (33.34%) were sedentary worker.
- ❖ In the view of occupation of mothers, in interventional group I, majority 16 (53.33%) were moderate worker, whereas in interventional group II, majority 15 (50.00%) were sedentary worker.
- ❖ With regard to type of family, in interventional group I, majority 16 (53.33%) were had nuclear family, where as in interventional group II, majority 17 (56.67%) were had nuclear family.
- ❖ While stating monthly family income, in interventional group I, majority 16 (53.33%) were earned between Rs 6000-10,000, whereas in interventional group II, majority 14 (46.67%) were earned between Rs 6000- 10,000.
- ❖ With stating the birth weight of the babies, in interventional group I, majority 19 (63.33%) were less than 2 kg, whereas in interventional group II, majority 17 (56.67) more than 2 .5 kg.
- ❖ While considering the passing meconium of the baby, in interventional group I, majority of the babies 16 (53.33%) were passed meconium adequately whereas, in interventional group II, majority 20 (66.67%) were passed meconium.
- ❖ While considering the crying pattern of the baby, in interventional group I, majority 18 (60.00%) were had high pitch cry, whereas in interventional group II, majority of the babies 18 (60.00%) were had high pitch cry.
- ❖ While considering the hydration status, in interventional group I, majority of the babies 11 (36.67%) had moderate hydration, whereas in interventional group II, majority of the babies 15 (50.00) had hydration.
- ❖ While considering the babies changing position, in interventional group I, majority of the babies 16 (53.33%) were changed half hourly, in

interventional group II, whereas majority of the babies 15 (50.00%) were changed half hourly

- ❖ While considering the Rh incompatibility, in interventional group I, majority 23(76.67%) were had Rh negative mother, whereas in interventional group II, majority of the babies 20(66.69%) were had negative mother.
- ❖ According to Blood Group, in interventional group I, majority of the babies 15 (50.00%) were 'B' group, whereas in interventional group II, majority of the babies 16 (53.33%) were 'B' group
- ❖ According to moulding of the skull, in interventional group I, majority of the babies 30 (100.00%) had normal moulding of the skull, whereas in interventional group II, majority of the babies 30 (100.00%) were normal moulding of the skull.

5.2 Discussion of the study based on its objectives

The first objective was to assess the level of bilirubin among babies with hyperbilirubinemia in both interventional group I and group II in neonatal intensive care units.

In interventional group I, majority of the babies 19 (63.33%) were had moderate level of bilirubin, 8 (26.67%) were had severe level and 3 (10.00%) were had mild level and none of them were had normal level.

In interventional group II, majority of the babies 16 (53.33%) were had moderate level of bilirubin, 11 (36.67%) were had severe level, 3 (10.00%) were had mild level and none of them were had normal level.

The present study findings was supported by Daniel S Seidman MD., (2003) A cross sectional survey has been conducted at Newborn Unit of Maternity & Paediatrics Hospital – Abha from January 2016 to August 2016. A total of 15 patients have been included in the study, who were diagnosed with hyperbilirubinemia due to urinary tract infection (UTI) after exclusion of unrelated

criteria. The study population consisted of 110 asymptomatic jaundiced neonates. the mean age was 7 ± 4 days, 73 (66.36%) neonates had a birth weight more than 2500 g, and 93 (84.55%) neonates were born at term (37–42 weeks of gestation); 70 (63.64%) neonates were male and 40 (36.36%) were female. Positive urine cultures were obtained for 15 (13.64%) of the 110 asymptomatic jaundiced infants enrolled ($p < 0.001$). Demographic characteristics of the jaundiced Conclusion: It could be concluded that UTI should be routinely investigated in early (≤ 10 days) idiopathic neonatal jaundice in which all other etiologic factors of neonatal hyperbilirubinemia are ruled out.

The second objective of the study to evaluate the effectiveness of continuous phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I.

In Interventional group I, the pre test, majority 19 (63.33%) were had moderate level, 8 (26.67%) were had severe level and 3 (10.00%) were had mild level and none of them were had normal level, whereas in the post test , majority of the babies 16 (53.33%) were had moderate level of bilirubin, 11 (36.67%) were had severe level, 3 (10.00%) were had mild level and none of them were had normal level.

This finding of the study was done by Enrico Zecca (2009) conducted a Randomized controlled trial study to determine the effectiveness of continuous phototherapy To evaluate the accuracy of transcutaneous bilirubin measurement in a large population of newborn infants, during phototherapy. 364 newborn infants with a mean (SD) gestational age of 34.6 (3) weeks and a mean birth weight of 2371 (805) grams. Total serum bilirubin, patched transcutaneous bilirubin and unpatched transcutaneous bilirubin were similar before phototherapy. After 52 (33) hours of phototherapy, the difference between serum bilirubin and patched transcutaneous bilirubin was 0.2 (3.1) mg/dl (not significant) while the difference

between serum bilirubin and unpatched transcutaneous bilirubin was 3.2 (3.0) mg/dl ($p < 0.001$). Statistical analysis showed a good agreement between serum bilirubin and patched transcutaneous bilirubin, while unpatched transcutaneous bilirubin underestimates serum levels. The difference between patched and unpatched values was significantly lower in preterm than in term infants (2.8 mg/dl vs. 3.6 mg/dl; $p < 0.001$).

Hence, H₁: There is a significant difference between pre test and post level of bilirubin among babies with hyperbilirubinemia in group I was accepted.

The third objective of the study to assess the effectiveness of intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group II.

In Interventional group II, the pre test, 16 (53.33%) were had moderate level, 11 (36.67%) were had severe level and 3 (10.00%) were had mild level and none of them were had normal level, whereas in the post test, majority of the babies 21 (70.00%) were had moderate level of bilirubin, 9 (30.00%) were had mild level and none of them were had normal or severe level.

It was also supported to the study conducted by Akram Debirian (2017) In this randomized clinical trial, all infants with physiological jaundice who referred for phototherapy to Mofid Hospital of Shahid Beheshti University of Medical Sciences, Tehran, Iran were selected by convenience sampling based on inclusion criteria and were randomly assigned into two groups of conventional phototherapy ($n = 35$) and phototherapy along with KMC ($n = 35$). The results showed that there was a significant difference in the average volume of skin bilirubin before treatment with cutaneous bilirubin every 24 h after treatment ($p < .001$). This significant difference was present in both intervention and control groups. Although the average volume of skin bilirubin every 24 h after treatment was lower in the

intervention group than the control group, this difference was not statistically significant ($p = .236$). Mean duration of hospitalization of infants in the intervention group was significantly lower than the control group (2.09 versus 3.03 d, $p < .001$).

Hence, H₂: There is a significant difference between pre and post test level of bilirubin among babies with hyperbilirubinemia in group II was accepted.

The fourth objectives was to compare the effectiveness between continuous and intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group 1 and group II.

In Group I, the pre test mean score was 13.13 with SD 2.62 ,whereas the post test mean score was 8.80 with SD 2.56 and the mean difference was 4.33 (32.97% of mean reduction score)

In Group II, the pre test mean score was 13.40 with SD 3.64, whereas the post test mean score was 10.83 with SD 2.35 and the mean difference was 2.56 (19.10% of mean reduction score)

On an average, babies with hyperbilirubinemia interventional group I (continuous phototherapy) were had 32.97% more reduction score in hyperbilirubinemia, whereas in group II babies were had 19.10% reduction score in hyperbilirubinemia. This study results shows intermittent phototherapy was more effective than continuous phototherapy.

The difference shows the intermittent phototherapy was more effective in reducing the level of bilirubin among babies with hyperbilirubinemia

The supportive finding of the study done by Atemeh Eghbalian Dr, Kamran Sabzian Dr (2012). This controlled randomized clinical trial study was performed on 96 full-term neonates admitted in the neonatal ward of Besat hospital of Hamadan city with indirect hyperbilirubinemia. The neonates were randomly divided into two groups. Continuous phototherapy group received phototherapy on

and off for two hours and half respectively. The intermittent group received phototherapy on and off for one hour. Phototherapy units and phototherapy condition in two groups were equal. Total serum bilirubin levels in two groups were measured 12, 24, 36, 48 hours after starting phototherapy. Two groups were matched regarding weight, age, and risk factors such as ABO and Rh incompatibility. The data were analyzed by t-test.

Hence, the stated hypothesis H₃: There is a significant difference between post level of bilirubin among babies with hyperbilirubinemia in group I and group II was accepted.

The Fifth objective of the study to associate the level of bilirubin among babies with hyperbilirubinemia and their selected socio demographic variables.

In order to find out the association between the post test level of pain in interventional group I with their selected socio demographic and clinical variables. Chi square analysis was done. As indicated among the babies undergoing continuous phototherapy in the post test. There was a significant association between the level of bilirubin and their selected socio demographic variables such as sedentary mother's babies ($\chi^2=6.38p=0.05$) were had more reduced bilirubin score than others. Where as in clinical variable less than 2kg birth weight babies ($\chi^2=6.91 P=0.01$), passed meconium adequately ($\chi^2=7.23 P=0.01$) with normal crying pattern ($\chi^2=4.53 P=0.02$) were had more reduced score than others. Other variable was not significantly associated.

In order to find out the association between the post test level of bilirubin in interventional group II with their selected socio demographic variables and clinical variables. Chi square analysis indicated there was a significant association between the level of bilirubin and their selected socio demographic variables such as

sedentary mother's babies, ($\chi^2=4.47$ $P=0.03$) were had more reduced bilirubin score than others. Whereas clinical variables such as more than 2.5kg birth weight ($\chi^2=4.52$ $P=0.03$) and passed meconium adequately ($\chi^2=9.42$ $P=0.01$) with high pitch cry ($\chi^2=4.47$ $P=0.03$) were had more reducing score in bilirubin level than others. Other variable was not significantly associated.

The present study finding was supported by a study done Hendrik Jan Vreman. (2004) conducted a nonrandomized prospective interventional study to the effectiveness of phototherapy in a tertiary care hospital of Western India. Ninety neonates with phototherapy range hyperbilirubinemia were assigned into three groups. 30 neonates in each to receive a Phototherapy using one of the three types of phototherapy machines. Total serum is the mainstay of treatment for about 3% of neonates in India who develop significant jaundice in phototherapy range. Comparison of mean total serum bilirubin was done using one way ANOVA. P-value of <0.05 was considered significant. Baseline parameters, total serum bilirubin at 24 hour post-phototherapy and at the point of stopping phototherapy in the three groups was not significantly different. The three types of phototherapy equipment studied were comparable in efficacy as measured by need for exchange transfusion and mean total serum bilirubin values at 24 hours post-phototherapy.

Hence H₄ hypothesis: There is a significant association between the level of bilirubin among babies with hyperbilirubinemia in group I (continuous phototherapy) and group II (Intermittent phototherapy) with their selected socio demographic variables was accepted.

SUMMARY
&
CONCLUSION

CHAPTER - VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter presents the summary of the study conclusion drawn, clarifies the limitation of the study, the implications and the recommendations, different areas like nursing practice, nursing education, nursing administration and nursing research deserve implication.

6.1 Summary of the study

The present study was to evaluate the effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai.

Objectives of the study were

- ❖ To assess the level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai.
- ❖ To evaluate the effectiveness of continuous phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I
- ❖ To evaluate the effectiveness of intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group II.
- ❖ To compare the effectiveness between continuous and intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in group I and group II.
- ❖ To associate the level of bilirubin among babies with hyperbilirubinemia and their socio demographic and clinical variables.

The following hypotheses tested were at 0.05 level of significance

H₁: There is a significant difference between the pre test and post test level of bilirubin among babies with hyperbilirubinemia in group I.

H₂: There is a significant difference between pre test and post test level of bilirubin among babies with hyperbilirubinemia in group II.

H₃: There is a significance difference between post test level of bilirubin among babies with hyperbilirubinemia in group I (continuous phototherapy) and group II (Intermittent phototherapy).

H₄: There is a significant association between the level of bilirubin among babies with hyperbilirubinemia in group I and group II with their selected socio demographic and clinical variables.

The Study assumptions were

- ❖ Babies with hyperbilirubinemia may prone to develop various complications
- ❖ Phototherapy helps to reduce the bilirubin level among babies with hyperbilirubinemia

The study was conducted in Neonatal intensive care unit at Government Rajaji Hospital, Madurai. The conceptual framework adopted Kramer's scale. Quantitative evaluative approach – True experimental, pre test post test research design was adopted. The independent variable was continuous phototherapy for Group I, intermittent phototherapy for Group II and the dependent variable was hyperbilirubinemia. Simple random sampling technique was used to select 30 samples for group I and 30 samples for group -II by picking up the available samples who fulfill the inclusion criteria during the period of data collection. After testing the validity reliability of the tool, a pilot study was conducted on 10 non study subjects of children with hyperbilirubinemia at neonatal ward GRH, Madurai, to find out the

feasibility and practicability. The main study was started from 04.06.2018 to 13.07.2018 based on the objectives and hypotheses. The data gathered was analysis by using both descriptive and inferential statistics.

The tool used in this study consists of two sections.

Section I

- ❖ Socio demographic variables
- ❖ Clinical Variables

Section II

- ❖ **Adopted Kramer’s scale** describe the level of bilirubin among babies.
- ❖ **Scoring interpretation**

Zone I face	-	5mg/dl
Zone II chest and upper abdomen	-	10mg/dl
Zone III Thighs and upper arms	-	12mg/dl
Zone IV Legs and forearm	-	15mg/dl
Zone V palms and sole	-	Above 15mg/dl

• **Scoring interpretation**

SCORE	INTERPRETATION
Below 5mg/dl	Normal
5-10mg/dl	Mild
10-15mg/dl	Moderate
Above15mg/dl	Severe

Content validity was obtained from five experts. Two experts in the field of Medicine and Child Health nursing and three experts in the field of child health nursing. Pilot study was conducted to find out the feasibility of the study and it did not show any major flaw in the design of the study. On the 1st day, after data

collection with Adopted Kramer's scale guide, the level of bilirubin was assessed, followed by continuous phototherapy for group I and intermittent phototherapy for group II, 6 times daily for 6 consecutive days. Post test was conducted on 6th day using the same Adopted Kramer's scale, as the same procedure was followed for all the 60 samples. Data was collected for six weeks from 4.06.2018 to 13.07.2018 and based on the objectives and hypotheses, data were analysed using descriptive and inferential statistics.

6.2 Major findings of the study

- According to the age group, majority of the babies 30 (100 %) belongs to the age group between 1-15 days both in interventional group I and group II.
- With regard to the gender, in interventional group I majority of the babies 17 (56.67%) were males, whereas in interventional group II majority 20 (66.67%) were males.
- Based on the religion, in interventional group I majority of the babies 22 (73.33 %) were Hindu, whereas in interventional group II majority of the subjects 20 (66.67%) were Hindu.
- With regard to place of domicile, in interventional group I, majority of the subjects 16 (53.33%) were hailed from rural area, whereas in interventional group II, majority of the babies 18 (60.00 %) were hailed from rural area.
- On the basis of the education of father, in interventional group I majority 11(36.67%) were studied up to primary education, whereas in interventional group II majority 11(36.67/%) were studied up to high school education.
- On the basis of education of mother, in interventional group I majority 12(40.00%) were studied up to high school education, whereas in

interventional group II majority 17 (56.66%) were studied up to high school education.

- In the view of occupation of father's, in interventional group I majority 12 (40.00%) were heavy worker, whereas in interventional group II majority 10(33.34%) were sedentary worker.
- In the view of occupation of mother's, in interventional group I, majority16 (53.33%) were moderate worker, whereas in interventional group II, majority 15(50.00%) were sedentary worker.
- With regard to type of family, in interventional group I, majority16 (53.33%) were had nuclear family, whereas in interventional group II, majority 17 (56.67%) were had nuclear family.
- While stating monthly family income, In interventional group I, majority16 (53.33%) were earned between Rs. 6000-10,000, whereas in interventional group II, majority 14 (46.67%) were earned between Rs. 6000- 10,000.
- With stating the birth weight of the babies, in interventional group I, majority 19 (63.33%) were less than 2 kg, whereas in interventional group II, majority 17 (56.67) more than 2 .5 kg.
- While considering the passing meconium of the baby, in interventional group I, majority of the babies 16 (53.33%) were passed meconium adequately, whereas in interventional group II, majority 20 (66.67%) were passed meconium.
- While considering the crying pattern of the baby, in interventional group I, majority 18 (60.00%) were had high pitch cry, whereas in interventional group II, majority of the babies 18 (60.00%) were had high pitch cry.

- While considering the hydration status, in interventional group I, majority of the babies 11 (36.67%) were had moderate hydration, whereas in interventional group II, majority of the babies 15 (50.00) were had hydration.
- While considering the babies changing position, in interventional group I, majority of the babies 16 (53.33%) were changed half hourly, in interventional group II, whereas majority of the babies 15 (50.005) were changed half hourly
- While considering the Rh incompatibility, in interventional group I, majority 23(76.675) were had Rh negative mother, whereas in interventional group II, majority of the babies 20(66.69%) were had Rh negative mother.
- According to Blood Group, in interventional group I, majority of the babies 15 (50.00%) were 'B' group, whereas in interventional group II, majority of the babies 16 (53.33%) were 'B' group.
- According to moulding of the skull, in interventional group I, majority of the babies 30 (100.00%) had normal moulding of the skull, whereas in interventional group II, majority of the babies 30 (100.00%) were normal moulding of the skull.
- In Interventional group I, the pre test, majority 19 (63.33%) were had moderate level, whereas in the post test, majority of the babies 16 (53.33%) were had moderate level of bilirubin.
- In Interventional group II, the pre test, 16 (53.33%) were had moderate level, whereas in the post test, majority of the babies 21 (70.00%) were had

moderate level of bilirubin, 9 (30.00%) were had mild level and none of them were had normal or severe level.

- In Group I, the pre test mean score was 13.13 with SD 2.62 ,whereas the post test mean score was 8.80 with SD 2.56 and the mean difference was 4.33 (32.97% of mean reduction score)
- In Group II, the pre test mean score was 13.40 with SD 3.64, whereas the post test mean score was 10.83 with SD 2.35 and the mean difference was 2.56 (19.10% of mean reduction score)
- On an average, babies with hyperbilirubinemia interventional group I (continuous phototherapy) were had 32.97% more reduction score in hyperbilirubinemia, whereas in group II babies were had 19.10% reduction score in hyperbilirubinemia. This study results shows intermittent phototherapy was more effective than continuous phototherapy.
- Chi square analysis reveals there was a significant association between the level of bilirubin and their selected socio demographic variables such as sedentary mother's babies ($\chi^2=6.38p=0.05$) were had more reduced bilirubin score than others. In clinical variables less than 2kg birth weight babies ($\chi^2=6.91 P=0.01$), passed meconium adequately ($\chi^2=7.23 P=0.01$) with normal crying pattern ($\chi^2=4.53 P=0.02$) were had more reduced score than others. Other variable was not significantly associated.
- In group II there was a significant association between the level of bilirubin and their selected socio demographic variables such as sedentary mother's babies, ($\chi^2=4.47 P=0.03$) were had more reduced bilirubin score than others, whereas clinical variables such as more than 2.5kg birth weight ($\chi^2=4.52P=0.03$) and passed meconium adequately ($\chi^2=9.42 P=0.01$) with

high pitch cry ($\chi^2=4.47$ $P=0.03$) were had more reducing score in bilirubin level than others. Other variable was not significantly associated.

6.3 Conclusion

The study findings revealed that continuous phototherapy group I is more effective than the intermittent phototherapy group II. Hence its continuous phototherapy reduce the bilirubin level among babies with hyperbilirubinemia.

6.4 Implications of the study

The investigator had drawn several implications from this study for various areas such as nursing practice, nursing education, nursing administration and nursing research.

Implications for nursing practice

- ❖ Nurse must practice proper hand hygiene practices for continuous versus intermittent phototherapy among babies with hyperbilirubinemia in order to reduce the bilirubin level.
- ❖ Nurse should monitor the hydration status and urine output periodically and also identify the colour of the skin for hyperbilirubinemia babies.
- ❖ Nurse can aware about the mechanism of action about phototherapy on level of bilirubin among babies with hyperbilirubinemia.

Implications for nursing education

- ❖ Nursing is an evolving profession every practice is based on evidence based care with adequate knowledge.
- ❖ Nurse educator motivate the students to use the Adopted Kramer's scale in their clinical practice.
- ❖ Nurse educator can conduct symposium, seminars regarding the effect of the phototherapy management among babies with hyperbilirubinemia.

- ❖ The frequency of phototherapy care is an area of controversy and may depend more on the babies condition.

Implications for nursing research

- ❖ The organisation and management may motivate the researchers to find various types of non pharmacological therapies for babies on the basis of cost effectiveness.
- ❖ Based on the study research can be conducted to assess the level of bilirubin by using Adopted Kramer's scale
- ❖ The study findings will encourage the further research studies on the age group between (15-28days) of babies with hyperbilirubinemia.
- ❖ A study can be done with large samples in different settings.

Implications for nursing administration

- ❖ Nurse administrator may pay special attention to student nurse to educate and evaluate their phototherapy procedure during their clinical practice.
- ❖ Nurse administrator can encourage the nurses to assess the level of bilirubin among babies and make it as one of the assessment procedure.
- ❖ Articles and materials needed for undergone phototherapy must be made available by the Administrator in the neonatal intensive care unit.

6.5 Recommendations

- ❖ A similar study can be replicated with larger sample for better generalization
- ❖ The same study can be conducted in larger groups in different setting.
- ❖ A study can be conducted to assess the knowledge, attitude and practice of nursing staff regarding management of hyperbilirubinemia
- ❖ A similar study can be conducted in other population like critically ill babies in critical care unit.

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APPENDICES

APPENDIX – I

Ethical committee approval to conduct the study



MADURAI MEDICAL COLLEGE
MADURAI, TAMILNADU, INDIA -625 020
(Affiliated to The Tamilnadu Dr.MGR Medical University,
Chennai, Tamil Nadu)



ETHICS COMMITTEE CERTIFICATE	
<p>Prof Dr V Nagaraajan MD MNAMS DM (Neuro) DSc.,(Neurosciences) DSc (Hons) Professor Emeritus in Neurosciences, Tamil Nadu Govt Dr MGR Medical University Chairman, IEC</p>	Name of the Candidate : K.Beula
<p>Dr.M.Shanthi, MD., Member Secretary, Professor of Pharmacology, Madurai Medical College, Madurai.</p>	Course : M.Sc., in Child Health Nursing
<p>Members 1. Dr.V.Dhanalakshmi, MD, Professor of Microbiology & Vice Principal, Madurai Medical College</p>	Period of Study : 2016-2018
<p>2. Dr.Sheela Malлика rani, M.D., Anaesthesia , Medical Superintendent Govt. Rajaji Hospital, Maudrai</p>	College : MADURAI MEDICAL COLLEGE
<p>3.Dr.V.T.Premkumar,MD(General Medicine) Professor & HOD of Medicine, Madurai Medical & Govt. Rajaji Hospital, College, Madurai.</p>	Research Topic : A study to evaluate the effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirumina in NICU at GRH, Madurai
<p>4.Dr.S.R.Dhamocharan, MS., Professor & H.O.D i/c. Surgery, Madurai Medical College & Govt. Rajaji Hospital, Madurai.</p>	Ethical Committee as on : 16.05.2018
<p>5.Dr.G.Meenakumari, MD., Professor of Pathology, Madurai Medical College, Madurai</p>	The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.
<p>6.Mrs.Mercy Immaculate Rubalatha, M.A., B.Ed., Social worker, Gandhi Nagar, Madurai</p>	<p><i>H. Shun</i> Member Secretary <i>Prof Dr V Nagaraajan</i> Chairman M.D., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hon) CHAIRMAN IEC - Madurai Medical College Madurai</p> <p><i>Dean / Convener</i> Dean / Convener DEAN Madurai Medical College Madurai-20</p>
<p>7.Thiru.Pala.Ramasamy, B.A.,B.L., Advocate, Palam Station Road, Sellur.</p>	
<p>8.Thiru.P.K.M.Chelliah, B.A., Businessman,21, Jawahar Street, Gandhi Nagar, Madurai.</p>	



APPENDIX – II

Content Validity Certificate

CERTIFICATION OF VALIDATION

This is to certify that the tool

SECTION A- DEMOGRAPHIC DATA

SECTION B- ADOPTED KRAMER SCALE

prepared for data collection by K.BEULA , M.Sc Nursing student , College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on dissertation entitled **“A STUDY TO EVALUATE THE EFFECTIVENESS OF CONTINUOUS VERSUS INTERMITTENT PHOTOTHERAPY ON LEVEL OF BILIRUBIN AMONG BABIES WITH HYPERBILIRUBINEMIA IN NEONATAL INTENSIVE CARE UNIT AT GRH - MADURAI”** has been validated by me.

N. Jessie
SIGNATURE OF THE EXPERT

Name : *Prof-Dr. N. Jessie*
Designation : *Professor Cum HOD.*
Date : *CSI Jeyaraj Annapackisiam
College of Nursing.
Madurai-4.*

CERTIFICATION OF VALIDATION

This is to certify that the tool

SECTION A- DEMOGRAPHIC DATA

SECTION B- ADOPTED KRAMER SCALE

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R. Jothi Lakshmi
SIGNATURE OF THE EXPERT

Name : *R. JOTHI LAKSHMI*
Designation : *Professor, Sacred Heart Nursing college, madurai-20.*
Date :

R. JOTHI LAKSHMI, M.Sc.(N)Ph.D
Associate Professor
Sacred Heart Nursing College
MADURAI - 20

CERTIFICATION OF VALIDATION

This is to certify that the tool

SECTION A- DEMOGRAPHIC DATA

SECTION B- ADOPTED KRAMER SCALE

prepared for data collection by K.BEULA , M.Sc Nursing student , College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on dissertation entitled "A COMPARATIVE STUDY TO ASSESS THE EFFECTIVENESS OF CONTINUOUS VERSUS INTERMITTENT PHOTOTHERAPY IN REDUCTION OF LEVEL OF BILIRUBIN AMONG BABIES WITH HYPERBILIRUBINEMIA IN INTENSIVE CARE UNIT IN GRH AT MADURAI" has been validated by me.


SIGNATURE OF THE EXPERT

Name :

Designation :

Date :

DIRECTOR I/C
INSTITUTE OF CHILD HEALTH &
RESEARCH CENTRE
GOVT. RAJAJI HOSPITAL
MADURAI-625020.

CERTIFICATION OF VALIDATION

This is to certify that the tool

SECTION A- DEMOGRAPHIC DATA

SECTION B- ADOPTED KRAMER SCALE

prepared for data collection by K.BEULA , M.Sc Nursing student , College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on dissertation entitled **“A COMPARATIVE STUDY TO ASSESS THE EFFECTIVENESS OF CONTINUOUS VERSUS INTERMITTENT PHOTOTHERAPY IN REDUCTION OF LEVEL OF BILIRUBIN AMONG BABIES WITH HYPERBILIRUBINEMIA IN NEONATAL INTENSIVE CARE UNIT IN GRH - MADURAI”** has been validated by me.

SIGNATURE OF THE EXPERT

Name

:

Handwritten signature
22/5/18

Designation

:

Handwritten text:
Dr. A. HELEN M PERDITA .
Principal,
Madurai Apollo Con.

Date

:

PRINCIPAL
MADURAI APOLLO COLLEGE OF NURSING
ELIYARPATHI VILLAGE
MADURAI SOUTH TAMIL NADU - 625 002

APPENDIX - III

CONSENT FORM

NAME :

DATE :

I have been well explained about the acetic acid soak on diabetic foot ulcer wound healing. The uses and the complications is clearly explained to the patients. Hereby agree to participant in this study if any complications arises the doctors, nurses and the management is not responsible for that. I have given full freedom to leave the study at any time and I am assured by the researcher that my information will be confidential.

Signature

ஓப்புதல் அறிக்கை

பெயர் :

நாள்:

எனக்கு இந்த செவிலிய ஆய்வினை பற்றிய முழு விவரம் விளக்கமாக எடுத்துரைக்கப்பட்டது. இந்த ஆய்வில் பங்கு கொள்வதில் உள்ள நன்மைகள் தீமைகள் பற்றி முழுமையாக புரிந்து கொண்டேன். இவ் ஆய்வில் இருந்து எந்த சமயத்திலும் விலகிக்கொள்ள முழு அனுமதி வழங்கப்பட்டுள்ளது.என்னுடைய சிகிச்சை ஆவணங்களை பார்வையிட்டு அதில் உள்ள விவரங்களை ஆய்வில் பயன்படுத்திக்கொள்ள முழு அனுமதி அளிக்கிறேன். என்னுடைய பெயர் மற்றும் அடையாளங்களை ரகசியமாக வைத்துக்கொள்ளப்படும் என்றும் எனக்கு உறுதியளிக்கப்பட்டது.

இப்படிக்கு,

APPENDIX – IV

LETTER SEEKING PERMISSION TO CONDUCTING THE STUDY

From

K.Beula
M.Sc (N) II year student
College of Nursing
Madurai Medical College
Madurai – 20

To

The professor and head of the department
Neonatal Intensive Care Unit
Institute of Child Health and Research Centre
Government Rajaji Hospital
Madurai

Through the proper channel,

Respected Sir,

Sub: College of Nursing, Madurai Medical College, Madurai – M.Sc (N) II year
Child Health Nursing Student – Permission for conducting Pilot study and
Main study from 21st May onwards in NICU at GRH, Madurai request –
regarding.

.....

As per the Indian Nursing Council and The Tamil Nadu Dr.M.G.R Medical
University curriculum requirement of M.Sc Nursing candidates are required to conduct a
dissertation study for the partial fulfillment of the course in their respective departments.

I wish to conduct a study topic “**A Comparative To Study To Assess The
Effectiveness Of Continuous Versus Intermittent Phototherapy In Reduction Of Level Of
Bilirubin Among Babies With Hyperbilirubinemia In Neonatal Intensive Care Unit At
GRH, Madurai**”. I assure that I will not interfere with the routine activities of the department.

Hence, I kindly request you to consider my requisition and permit me to conduct
the study in this setting.

Thanking you,

Place: Madurai

Date: 18.05.2018

N. Madan

*Forwarded
S.P.
18/5/18*

Yours Obediently
K. Beula
(K.Beula)

APPENDIX - V

SOCIODEMOGRAPHIC VARIABLES

1. Age in months

- a) 1 - 15 days
- b) 15 – 28 days

2. Gender

- a) Male
- b) Female

3. Religion

- a) Hindu
- b) Christian
- c) Muslim
- d) others

4. Place of domicile

- a) Urban
- b) Rural

5. Educational status of father

- a) No formal education
- b) Primary school education
- c) High school education
- d) Graduates

6. Educational status of the mother

- a) No formal education
- b) primary school education
- c) High school education
- d) Graduates

7. Occupation of Father

- a) Sedentary worker
- b) Moderate worker
- c) Heavy worker

8. Occupation of Mother

- a) Sedentary worker
- b) Moderate worker
- c) Heavy worker

9. Type of family

- a) Nuclear family
- b) Joint family

10. Family income per month

- a) Below Rs 2000-4000
- b) Rs 4001- 6000
- c) Rs 6001 – 10,000

CLINICAL VARIABLES.

1. Birth weight :
 - a) Less than 1.5 KG
 - b) 1.5 to 2 KG
 - c) More than 2.5KG
2. passing mechanism
 - a) Adequate
 - b) Passed
 - c) Not Adequate
3. Crying Status
 - a) High Pitch Crying
 - b) Normal Crying
 - c) Not Crying
4. Hydration Status
 - a) Hydration
 - b) Moderate Hydration
 - c) D Hydration
5. Changing Position
 - a) Half hourly
 - b) Second hourly
6. Rh incompatibility
 - a) Negative
 - b) Positive
7. Blood Type Incompatibility
 - a) A Group
 - b) B Group
 - c) ABO Group
 - d) O Group
- 8 Moulding of skull
 - a) Cephal hematoma
 - b) Caput succedenum
 - c) Others

APPENDIX - VI

ADOPTED KRAMER'S SCALE

Score	Area of body	Serum bilirubin levels
1.	Face (blue)	4—6mg/dl
2	Chest,upper abdomen	8-10mg/dl
3	Lower abdomen(thighs) yellow	12-14mg/dl
4	Arms, lower legs(pink)	15-18mg/dl
5	Palms, soles(red)	15-20 mg/dl

Adopted Kramer's scale describe the level of bilirubin among babies.

Scoring interpretation

Zone I face	-	5mg/dl
Zone II chest and upper abdomen	-	10mg/dl
Zone III Thighs and upper arms	-	12mg/dl
Zone IV Legs and forearm	-	15mg/dl
Zone V palms and sole	-	Above 15mg/dl

Level of Bilirubin	Interpretation
Below 5mg/dl	Normal
5-10mg/dl	Mild
10-15mg/dl	Moderate
Above15mg/dl	Severe

APPENDIX - VII

சுய விவரப்படிவம்

1. குழந்தையின் வயது
 - a. 1 முதல் 15 நாள்
 - b. 15 முதல் 28 நாள்
2. பாலினம்
 - a. ஆண் குழந்தை
 - b. பெண் குழந்தை
3. மதம்
 - a. இந்து
 - b. கிறிஸ்தவர்
 - c. முஸ்லீம்
 - d. மற்றவை
4. இருப்பிடம்
 - a. கிராமம்
 - b. நகரம்
5. தந்தையின் கல்விநிலை
 - a. ஆரம்பகல்வி
 - b. உயர்நிலைக்கல்வி
 - c. மேல்நிலைக்கல்வி
 - d. பட்டதாரி

6. தாயின் கல்விநிலை
- a. ஆரம்பக்கல்வி
b. உயர்நிலைப்பள்ளி
c. மேல்நிலைக்கல்வி
7. தந்தையின் தொழில்
- a. கூலிவேலை
b. சுயதொழில்
c. வியாபாரம்
8. தாயின் தொழில்
- a. குடும்பதலைவி
b. கூலிவேலை
c. சுயதொழில்
9. குடும்பவகை
- a. தனிக்குடும்பம்
b. கூட்டுக்குடும்பம்
c. விரிவாக்கப்பட்டகுடும்பம்
10. குடும்பவருமானம்
- a. 2000 - முதல் 4000
b. 4000 - முதல் 6000
c. 6000 - முதல் 8000

மருத்துவமாறிகள் பற்றிய விபரம்

1. குழந்தையின் எடை
 - அ. 1.5 க்கும் அதிகமான எடை
 - ஆ. 1.5 லிருந்து 2கிலோ எடை வரை
 - இ. 1500 க்கும் குறைவான எடை
2. மலம் கழிக்கும் தன்மை
 - அ. சராசரியாக
 - ஆ. மிதமாக
 - இ. இல்லை
3. குழந்தை அழுகுரலின் தன்மை
 - அ. அதிக வீரியமுடன்
 - ஆ. சராசரியான வீரியமுடன்
 - இ. இல்லை
4. உடலில் உள்ள நீர்ச்சத்தின் தன்மை
 - அ. சரியான நீர்ச்சத்து
 - ஆ. மிதமான நீர்ச்சத்து
 - இ. நீர்ச்சத்து இன்மை
5. குழந்தை திருப்பி படுக்கும் நிலை
 - அ. ½ மணி நேரத்திற்கு ஒருமுறை
 - ஆ. 1மணி நேரத்திற்கு ஒருமுறை
 - இ. 2மணி நேரத்திற்கு ஒருமுறை

6. Rh இணக்கமின்மை

அ. எதிர்மறை

ஆ. நேர்மறை

7. இரத்த வகை

அ. "ஏ" இரத்தவகை

ஆ. "பி" இரத்தவகை

இ. "ஏ, பி, ஓ, இரத்தவகை

8. மண்டைஓடு அச்சின்தன்மை

அ. வீக்கம் உண்டு

ஆ. வீக்கம் இல்லை

APPENDIX – VIII

ENGLISH EDITING CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation “ A Comparative Study to evaluate the effectiveness of continuous versus intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai ” done by Mrs.Beula. K, M.Sc Nursing II year student, College of Nursing, Madurai Medical College, Madurai-20 has been edited for English language appropriateness.

Name: *A. RANI LATHA*

Designation: *PG-ENGLISH*

A. Rani Latha
29/11/18
Signature:

Institution:



APPENDIX – IX

TAMIL EDITING CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation “ A Comparative Study to evaluate the effectiveness of continuous verses intermittent phototherapy on level of bilirubin among babies with hyperbilirubinemia in neonatal intensive care unit at GRH Madurai.” done by Mrs.Beula.K, Msc Nursing II year student, College of Nursing, Madurai Medical college, Madurai- 20 has been edited for Tamil language appropriateness.

Name: *நா. சூயக்கொடுக்கு சிப்கொடிய*

Designation: *புத்தககல் அலகரிக்கல்
[தமிழ்]*

S. S. S. S.
28.7.18
Signature.

Institution:



APPENDIX – X
Photographs



