EFFECTIVENESS OF ORAL SUCROSE SOLUTION UPON PAIN PERCEPTION AMONG INFANTS UNDERGOING IV CANNULATION

By

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A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

APRIL 2014

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DECLARATION

I hereby declare that the present dissertation entitled **"Effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation"** is the outcome of the original research work undertaken and carried out by me under the guidance of **Dr. Latha Venkatesan,** M.Sc (N)., M.Phil., Ph.D (N)., Principal, Apollo College of Nursing, **Prof. Nesa Sathya Satchi, M.Sc (N)., Ph.D (N).,** HOD, Department of Child Health Nursing, Apollo College of Nursing, Chennai. I also declare that the material on this has not found in any way, the basis for the award of any degree or diploma in this university or any other universities.

M.Sc., Nursing II Year

ACKNOWLEDGEMENT

I thank **God Almighty** for being with me and guiding me throughout my endeavour and showering His profuse blessings in each and every step to complete the dissertation.

I proudly express my sincere gratitude to **Dr.Latha Venkatesan, M.Sc (N)., M.Phil(N)., Ph.D(N).**, Principal, Apollo College of Nursing for her relentless efforts in setting higher goals for us to achieve and her excellent guidance, caring spirit, support and valuable suggestions during the course which paved the way for our overall development.

My sincere thanks to **Prof.Lizy Sonia, M.Sc (N)., Ph.D (N)** Vice Principal, Apollo College of Nursing for her excellent guidance during the course of my work.

My heartfelt gratitude to **Prof.Nesa Sathya Satchi,M.Sc(N)., Ph.D(N).,** HOD paediatric nursing department for her valuable suggestions, elegant directions, invaluable caring spirit and profound support throughout the study, the success of this work is credited to her.

My bouquet of thanks to **Dr.G.Krishna Priya, MBBS., MRCPCH (UK), Consultant Pediatrician, Apollo Speciality Hospital, Vanagaram** for her valuable guidance and suggestions.

My sincere thanks to **Prof. K. Vijayalakshmi, M.Sc (N)., Ph.D(N)., M.A. Psychology,** Research coordinator, Apollo College of Nursing for her valuable suggestions and support.

I would like to specially thank **Mrs.Jamuna Rani, M.Sc (N).,** Reader, **Mrs.Cecilia Mary, M.Sc(N).,** Lecturer and **Mrs.Jennifer.G, M.Sc (N).,** Lecturer**,** Department of Paediatric Nursing for their guidance and profound support throughout the study.

I am immensely grateful to all the **experts** for validating the tool and I also would like to extend my thankfulness to all the faculty of Apollo College of Nursing for their suggestions and encouragement throughout the study

I sincerely thank **Mrs. Salomi,** Deputy Nursing Superintendent and **Apollo Pharmacy** Apollo Childrens Hospital for permitting me to utilize all the facilities in the research setting. Their good nature, kind-heartedness and contagious energy will always be remembered. I also wish to thank all the participants of this study.

I am indeed indebted to **Mr. Kannan R.,** and members of **Universe Computers, Vanagaram** for helping me to successfully complete my study.

A note of thanks to the **Librarians** at Apollo College of Nursing and Dr.Tamilnadu M.G.R. University for their help in providing the necessary reference materials which I required.

I am indebted to my beloved husband **Mr. Prashant Samalesan,** father **Mr. Abraham Thankappan**, my mother **Mrs. Annamma Thankappan** and my brother **Mr. Manu Abraham** for their love and prayerful support throughout this study.

I thank my **classmates** for being available for their help whenever I needed them. I thank all those who have supported me in prayer and those who have helped me even in a small way to successfully complete this study.

SYNOPSIS

An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai.

The Objectives of the Study were,

1. To determine the extent of pain perceived by the control and experimental group of infants during IV cannulation.
2. To determine the effectiveness of oral sucrose solution upon pain perception of experimental group of infants during IV cannulation.
3. To determine the association between selected demographic variables and pain perception of control and experimental group of infants during IV cannulation.
4. To determine the association between selected clinical variables and pain perception of control and experimental group of infants during IV cannulation
5. To determine the level of satisfaction of nurses in experimental group of infants during IV cannulation.

The conceptual framework for the study was based on “Katharine Kolcaba theory of holistic comfort (1994)” given by “Katharine Kolcaba” which was modified for the present study. A true experimental post test only design was used in this study. The present study was conducted in Apollo Children’s Hospital, Chennai. A sample size of 60 children who met the inclusion criteria were chosen

for this study of which 30 were taken for the control group and 30 for the experimental group using simple random sampling.

The study variables were pain perception of the infants and oral sucrose solution. An extensive review of literature and guidance by experts formed the foundation to the development of Demographic variables proforma, Clinical variables proforma, Riley's Infant Pain Scale and Rating Scale on the level of satisfaction about oral sucrose administration before IV cannulation.

The data collection tools were validated and the reliability was established through test-retest method. After the pilot study, the data for the main study was collected by interviewing the parents, nurses and by self observation.

The researcher collected the demographic variables and clinical variables by interviewing the parents and by the help of medical records. The infants in the control group were assessed using a Riley Infant Pain Scale for pain perception during IV cannulation without any intervention. In the experimental group, oral sucrose solution was given 1ml before IV cannulation and post assessment of pain was done immediately by using Riley Infant Pain Scale.

After the intervention IV cannulation was started and post assessment of pain was done by using Riley's Infant Pain Scale (RIPS). The level of satisfaction of nurse's regarding oral sucrose solution administration during IV cannulation was assesses using a rating scale. The data analysis was carried out by descriptive statistics and inferential statistics.

Major Findings of the Study were

- Majority of the infants were aged 4-6 months (70%, 70%), males (63.33%, 63.33%), with a birth weight of 2.5- 3.5 kgs (93.33%, 73.33%) in both control and experimental group respectively
- Significant percentage of infants were from nuclear family (83.33%, 83.33%), residing in suburban area (50%, 33.33%) their parents were graduates (70%, 66.66%), salaried (63.33%, 46.66%), with a family income of <30,000 rupees (46.66%, 43.33%) in both control and experimental group respectively.
- Most of the infants had genitourinary disorders (30%, 16.66%). The type of the needle used for IV cannulation was venflon (63.33%, 73.33%). Majority of infants had IV cannulation for injection purpose (53.33%, 46.66%) and IV cannulation was performed by nurses (96.66%, 96.66%) in both control and experimental group respectively.
- Significant percentage of infants had no previous experience of IV cannulation (60%, 43.33%) and care providers were not present during the procedure most of the IV cannulations (83.33%, 86.66%) in both control and experimental group respectively.
- Majority of the infants in control group had severe pain (53.33%) where as in experimental group (50%) had mild pain. Hence the null hypothesis Hence, the null hypothesis H_{O1} was rejected.
- The mean and standard deviation of pain score was (M=11.6, SD= 3.77) in control group of infants who received sucrose before IV cannulation when compared to the experimental group of infants (M=5.6, SD=12.44). The difference was statistically significant at ***$p<0.001$, the‘t’ value was

21.3.Hence the null hypothesis Hence, the null hypothesis H_{O2} was rejected.

- There was a significant association between the selected demographic variables like age of the infant, and pain perception of the children at *** $p<0.001$ in experimental group had no significant association between other demographic variable like gender, birth weight, type of family and pain perception in experimental group during IV cannulation. Hence, the null hypothesis H_{03} was partially rejected with regard to the age of the infant in experimental group of infants and retained with regard to other demographic variables in control and experimental group of infants.
- There was no significant association between clinical variables like disease condition, type of needle used, size of cannula, presence of care provider during procedure and pain perception at **$p<0.01$ in control group. Hence, the null hypothesis H_{04} was partially rejected with presence of care provider during procedure in the infants in experimental group and completely retained with regard to other clinical variables in control and experimental group of infants.
- Majority of the nurses (90%) were highly satisfied. It indicates that the nurses were also under stress and anxious regarding painful experience of infant during the IV cannulation or any other invasive procedure

Recommendations

- The study can be conducted on larger sample to generalize the results.
- The study can be conducted in different settings.
- The same study can be conducted for pain management during other invasive procedure like intra muscular injection, lumbar puncture etc.

- A comparative study can be conducted to evaluate the effectiveness of various other interventions to reduce pain.
- The study can be conducted among children of different age groups.
- The study could be conducted to assess the knowledge and attitude of nurses on pharmacological and non pharmacological pain management during IV cannulation
- A study can be done to compare the effectiveness of oral sucrose solution with different dosage and time duration.

TABLES OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Background of the Study

"Pain is only what you allow it to be"

~ Cassandra Clare

Parents may feel a strong sense of love toward their baby at birth. Learning to know their infant and maintaining the love relationship is the intimate process that unites separate individuals into a family. Children are the ones who are very vital for deciding how the world is going to be after some years. So if one can do some good in the life of a child then there can be change, at least a slightest change, in the world to come. Infancy signifies the beginning of life as an independent individual who is the future citizen of the nation. The physical changes and development achievements of infants are so dramatic than other stages of development in life.

The word infant comes from the Latin word "infans" meaning "unable to speak" or "speechless". The term infant is typically applied to young children between the ages of 1 month and 12 months. Spontaneity and enjoyment of the infant by the parents or their substitutes is probably of greater significance to the baby's well- being than the specific procedures used in care giving.

Pain is a subjective experience, and infants and children respond to pain with the behavioral reactions that depend upon the age and cognitive processes. Pain may occur as a result of procedures, surgery, illness or injury. During infancy, reflective behavior

is dominant. Between 3 and 10 months of age, infants are able to localize pain as they withdraw their limbs, stool, hiccups and cry. After 6 months, an infant's response to pain is influenced by the recall of prior pain experience and the emotional reactions of parents or caregivers during a procedure. These older infants react intensively with physical resistance and uncooperativeness. The toddler is able to localize pain and reacts by withdrawing the affected part.

Infants are becoming increasingly subjected to longer battery of invasive investigations which are painful. Assessing and treating pain in infants can be difficult. Infants and children are often unable or unwilling to communicate the presence, location and intensity of pain. Parents may be reluctant to acknowledge or to help to validate their child's pain. The American Academy of Pediatrics and the American Pain Society addressed the need for appropriate pain management in children in their joint statement presented in 2001. They noted that, despite comprehensive research, anecdotal experience and ample knowledge from the past 10 to 15 years, the assessment and treatment of pain in children frequently remain inadequate.

Pediatric intravenous cannulation is an integral part of modern medicine and is practiced in virtually every health care setting. Venous access allows the sampling of blood, as well as administration of fluids, medications, parenteral nutrition, chemotherapy, and blood products. Pain from intravenous cannulation is a source of distress in children, their parents and health care professionals, and if not addressed, can lead to pre- procedural anxiety in future procedures, medical fear, and healthcare avoidance behaviors. It is estimated that up to 25% of adults have needle fears, the

majority of people with needle fears develop them from childhood period. Unfortunately, infants have limited means to cope with pain because they cannot rub a painful area and stimulate non nociceptive touch fibers that would block the pain sensation, nor can they distract themselves through visualization.

According to WHO administration of oral sucrose (in dosages of 0.5–2 ml of 12%–50% solution) approximately two minutes prior to single heel lance is effective in providing pain relief in both term and preterm infants. However, the longer-term effects of sucrose, especially for extremely premature babies, who are at the greatest risk of receiving repeat doses, is not known. The effects of oral sucrose solution had tested for may procedures such as intravenous cannulation, subcutaneous injection, nasogastric tube insertion, circumcision.

Painful experiences in early life may leave of altered sensitivity to subsequent pain in later life. Neonatal pain can have profound and perhaps permanent effects on development. Experience of pain during an early stage of development known as the sensitive or critical period permanently alters pain perception in the adult. Early painful experiences will be remembered by the developing brain, perhaps for the entire life of the individual.

Denise Margaret Harrison (2008) wrote an article “Oral sucrose for pain management in infants: Myths and misconceptions”. He had explained eight myths about administration of oral sucrose they are Not ‘‘baby friendly’’, Grows bacteria, Risk of dental caries, Increased risk of poor neurological outcomes in infants <32 weeks,

Increases risk of necrotising enterocolitis, Results in hyperglycaemia, Not effective in older babies, Repeated doses leads to development of tolerance to sucrose.

There are no systemic pharmacological treatments that are appropriate to provide relief at during minor procedures such as intravenous cannulation, immunizations in this age group. Although the ability to measure pain in children has improved dramatically in recent years, assessment of pain in children continues to be complex and challenging. Three types of measures- behavioral, physiologic, and self report- have been developed to measure children's pain.

Behavioral assessment is useful for measuring pain in infants and preverbal children who do not have the language skills to communicate that they are in pain. Behavior provides important information that cannot be obtained from self- report. Behavioral measures are most reliable when measuring short, sharp procedural pain, such as during injections or lumbar puncture. In older children pain scores on behavioral measures do not always correlate with the children's own reports of pain intensity. The 4 most commonly used behavioral measures are the Face**,** Legs, Activity, Cry, Consolability scale (FLACC), Children's Hospital Eastern Ontario Pain Scale (CHEOPS), Toddler- Preschooler Postoperative Pain Scale (TPPPS), and Parents Post operative Pain Scale (PPPRS).

Unrelieved pain may lead to potential long- term physiologic, psychological, and behavioral consequences. Pain is often associated with fear, anxiety, and stress. A number of nonpharmacologic techniques such as distraction, relaxation, guided imagery and cutaneous stimulation, provide coping strategies that may help reduce pain

perception, make pain more tolerable, decrease anxiety. Experimentation with several strategies that are suitable to the child's age, pain intensity, and abilities is often necessary to determine the most effective approach.

Non nutritive sucking attenuates behavioral, physiologic, and hormonal responses to pain from procedures, such as heel punctures, venipuntures, and immunization injections. Causes of pain in children are illnesses- medical and surgical, procedures and accidents.

Pain is both a physical and emotional state. Infants feel pain in their body; they might feel sensations like burning, throbbing, or cramping. They may also have thoughts and memories about pain. Because infants do not yet have language, it is hard for us to know exactly what they think of it. Unfortunately there is no practice of pain reduction measures during intravenous cannulation in many institutions. It is necessary to promote pain management measures as routine practice in the hospitals. Oral sucrose solution is an effective analgesic which can be easily implemented. It is safe, cost effective and easily prepared that can be given for infants to reduce pain experience before IV cannulation. Thus researcher decided to conduct the study to assess the effectiveness of pain perception among infants undergoing IV cannulation.

Need for the Study

Intravenous cannulation becomes more difficult and painful as children become increasingly anxious and fearful after each failed attempt, because fear activates the sympathetic nervous system and causes vasoconstriction. Anxiety can be reduced by

providing a warm, supportive atmosphere in which the child feels comfortable expressing fears. Distractions, such as conversation, video games, television, or music with headphones also may help to reduce distress.

Current population of India is 1,21,01,93,422 of which paediatric population comprises 31.4% that is; it comprises major part of the population. Pain is an uncomfortable phenomenon. It is one of the factors which interfere with the quality of life of the people. Even if pain is the same, the experience of it varies with individuals. The factors that contribute to the individual pain perception are age, sex, ethnicity, genetic, psycho-social variables.

Difficulty in placing a peripheral intravenous line is a very common and frustrating experience for nurses, especially those who care for children. Peripheral DVA (difficulty venous access) is a clinical condition in which multiple attempts or special interventions are anticipated or required to achieve and maintain peripheral venous access. By diversional therapies nurses can prevent multiple pricking for IV access. (Alison Brunt)

We try to do our best to reduce the feelings and the worry about pain. Some measurements are change the infant's environment. Less noise and activity at the bedside will help calm the baby. Sucking on a pacifier can help an infant cope with procedures and other painful events. Distractions like using a soothing voice, music, stories, or songs can take an infant's attention away from the pain or the procedure. Rhythmic motion – rocking or other slow, steady movement can help. Positioning infants so that they are more contained and move less can be very comforting. Doing

Kangaroo Care or skin-to-skin contact can be very soothing. Rubbing or gentle massage helps relax the muscles and the nerves that send pain messages to the brain. Then the brain does not sense as much pain. Putting something warm or cold, like a warm wrap or an ice pack, on an injured area can reduce pain from inflammation or sore muscles.

Few intravenous lines in children are inserted successfully on the first try. A recent study of 593 attempts in centres with paediatric hospitalist services revealed that the average child required 2.2 sticks to achieve venous access, and that successful insertion took more than half an hour. The first attempt at insertion was successful in fewer than half the children, and a third of them could not be cannulated even after 2 tries. Peripheral intravenous lines could not be placed at all in 5% of cases. A separate review of peripheral intravenous line insertions in children revealed that the first attempt was successful in just 53% of cases, while 67% were successful within 2 attempts and 91% were successful within 4 attempts. Initial success rates in infants may be even lower (33%).

As nurses we do not have the right to administer medicine without a physician order. We can best manage the procedural pain in infants by non pharmacological measures such as oral sucrose solution, music therapy, cold application, swaddling. Many pain assessment tools are developed to assess the degree and intensity of pain in children as well as in adults. Even though infants are still developing and cannot tell us about their pain, they do feel pain, and their pain can be treated. The health care team wants to do all they can to relieve pain and make the baby comfortable.

Pain can have many causes, including soreness after the surgery, procedures such as starting an IV or drawing blood for a lab test. Blood drawing through an IV cannula might be the first intravenous prick for most of the infants. Proper intravenous access serve as an opportunity to deliver life saving measures in many conditions. Ultrasound guidance increases the likelihood of successful peripheral cannulation in difficult-access patients, it will avoid distress in infants by multiple pricking. Though it is not affordable in many institutions health care professionals can encourage non pharmacological measures to alleviate the pain.

The infants' pain often remains inadequately managed. Infants respond to noxious stimuli through physiologic indicators (increased heart rate and blood pressure, increased intra cranial pressure, decreased SPO2, decreased skin blood flow) and behavioural indicators such as (muscle rigidity, facial expression, crying, withdrawal, sleeplessness).

The challenge of providing simple, safe and effective pain relieving intervention for the infants is an ongoing dilemma. Neonates and young infants have immature central nervous system, lacking myelination of pain fibres and therefore clinicians believed that these infants are incapable of perceiving pain. Research has challenged this assumption and demonstrated that neonates and infants do indeed feel pain. There is an increasing focus on the recognition, assessment and management of pain in children. Children undergo many painful procedures in different clinical environment. Breast feeding in infants under age 6 months and use of sucrose or lidocaine in children aged 1 to 48 months has significantly reduced crying time and pain scores.

In addition to routine well child visit pain, injuries and illnesses frequently require anxiety provoking painful procedures. Infants do perceive and remember pain, demonstrating heightened pain responses to other painful procedures later in life. Assessing and treating pain in infants can be difficult. Infants and children are often unable or unwillingly to communicate the presence, location and intensity of pain. A number of non pharmacological techniques such as distraction, relaxation, skin cooling techniques, cutaneous stimulation, sweet tasting solutions provide coping strategies that may help reduce perception make pain more tolerable, reduces anxiety and prevents usage of analgesics.

However, there has been very little research to determine a natural, cost effective intervention to pain perception later in life. Oral sucrose administration is a preferred method of infant feeding in the first year of life is considered to be an effective pain reducing intervention during IV cannulation. Oral sucrose has been shown to have analgesic effects in infants undergoing medical procedures. Human desire for sweet taste spans all ages, races, and cultures. Throughout evolution, sweetness has had a role in human nutrition, helping to orient feeding behavior toward foods providing both energy and essential nutrients. Infants and young children in particular base many of their food choices on familiarity and sweet taste. Sweet taste receptors are expressed not only in the mouth but also in other areas, particularly the gut and pancreas. Newborns can differentiate varying degrees of sweetness and will consume a greater volume of a solution that tastes sweeter. Their faces relax when tasting something sweet, and this relaxation is often accompanied by a smile. The majority of developmental studies on sweet taste responsiveness among children have been conducted with naturally occurring sugars: sucrose, lactose, or fructose. In general, infants and children selected

sweet solutions over plain water and preferred the sweeter sugars to those that were less sweet.

As IV (Intravenous Venous) cannulation is a procedure for infants in certain situations. It is the nurses' responsibility to alleviate pain during insertion and it reduces the anxiety of the care giver, increases the compliance and the infant feel comfort. This motivated the researcher to conduct an experimental study to assess the effectiveness of oral sucrose solution upon pain perception of infants during IV cannulation.

Statement of the Problem

An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai.

Objectives of the Study

1. To determine the extent of pain perceived by the control and experimental group of infants during IV cannulation.
2. To determine the effectiveness of oral sucrose solution upon pain perception of experimental group of infants during IV cannulation.
3. To determine the association between selected demographic variables and pain perception of control and experimental group of infants during IV cannulation.
4. To determine the association between selected clinical variables and pain perception of control and experimental group of infants during IV cannulation
5. To determine the level of satisfaction of nurses in experimental group of infants during IV cannulation.

Operational Definitions

Effectiveness

In this study, it refers to the expected and desired change in the level of pain perceived by infants on administration of oral sucrose solution. It is measured using Riley's Infant Pain Scale (RIPS).

Oral Sucrose Solution

In this study, it refers to the administration of 15 drops of 24% sucrose solution to infants orally 2 minutes before IV cannulation prepared by researcher.

Pain Perception

In this study, it refers to the pain experienced by infants during IV cannulation measured using RIPS. Riley infant pain scale is a rating scale to assess the pain in infants. Using Riley Infant Pain Scale (RIPS), the observer can arrange the behaviours into groups in 4 columns, and the values in each column range from 0(no pain) to 3 (severe pain). Parameters used to evaluate are facial expression, body movements, sleep, verbal/ vocal, consolability, response to movements/ touch.

Infant

In this study, it refers to children aged between 1month to 6 months admitted in Apollo Children's Hospital, Chennai.

IV Cannulation

In this study, it refers to the insertion of a venous cannula into a vein, primarily for the administration of intravenous fluid & medication, blood collection, blood product administration. This invasive procedure is a common source of pain in infants.

Assumptions

- Pain is an universal experience.
- Children experience pain during IV cannulation.
- Children receive and react to pain same as adults.
- Pain can be reduced by non pharmacological methods.
- Sucking reduces response to painful stimuli

Null Hypothesis

H_{01}: There will be no significant difference in the pain perception of the control and experimental group of infant during IV cannulation.

H_{02}: There will be no significant difference between the pain perception of infant and administration of oral sucrose solution

H_{03}: There will be no significant association between selected demographic variables and pain perception in control and experimental group of infant during IV cannulation.

H_{04}: There will be no significant association between selected clinical variables and pain perception in control and experimental group of infant during IV cannulation.

Delimitations

This study was delimited to the infants who

- Are aged between 1 month- 6 months
- Are admitted in Apollo Children's Hospital , Chennai
- Whose care givers understand Tamil and English

Conceptual Framework

The conceptual framework deals with the interrelated concepts that are assembled together in some rational schemes by virtue of their relevance to a common theme (Polit & Beck, 2008)

The conceptual framework is a process of ideas which are formed and utilized for the development of research design. It helps the researcher t o know what data needs to be collected and gives direction to the entire research process. In this research the researcher selected Katharine Kolcaba theory of holistic comfort (1994). This model addresses the recipients comfort measures which are known in a variety of ways. Kolcaba's (1194) believed that the nursing is the international assessment of comfort which needs design of comfort measures to address those needs and assessment of comfort level after implementation compared to the previous baseline.

The major concepts identified in this model are health care needs, comfort measures, interacting variables, comfort and health seeking behaviors.

Health Care Needs

Kolcaba defines health care needs for comfort arising from stressful health care situation that cannot be met by recipient's traditional support system. In the present study it implies that the infant develops pain during IV cannulation. It will be stressful to the care giver and infants and which could be monitored through pain measurement.

Comfort Measures

It is defined as nursing intervention designed to address specific comfort needs of recipients. In this study the nursing intervention is administration of oral sucrose solution before IV cannulation.

Interacting Variables

According to Kolcaba's it is described as interacting forces that influences recipient's perception of total comfort. Here demographic variable, clinical variable and level of satisfaction of nurses.

Comfort

It defines the state that is experienced by recipients of comfort measures. In this study comfort refers to the level of pain measured using Riley's infant pain scale during IV cannulation.

Health Seeking Behavior

It represents the broad category of subsequent outcomes related to pursuit of health as defined by the recipient in the consultation with the nurses. In the study it is the internal behaviour and external functional status of infants which is measured by Riley's Infant Pain Scale (RIPS).

The outcome may be more co operation with the IV cannulation or less co operation with IV cannulation. More co operation with IV cannulation indicated that the therapy is effective and is leading to positive health seeking behavior.

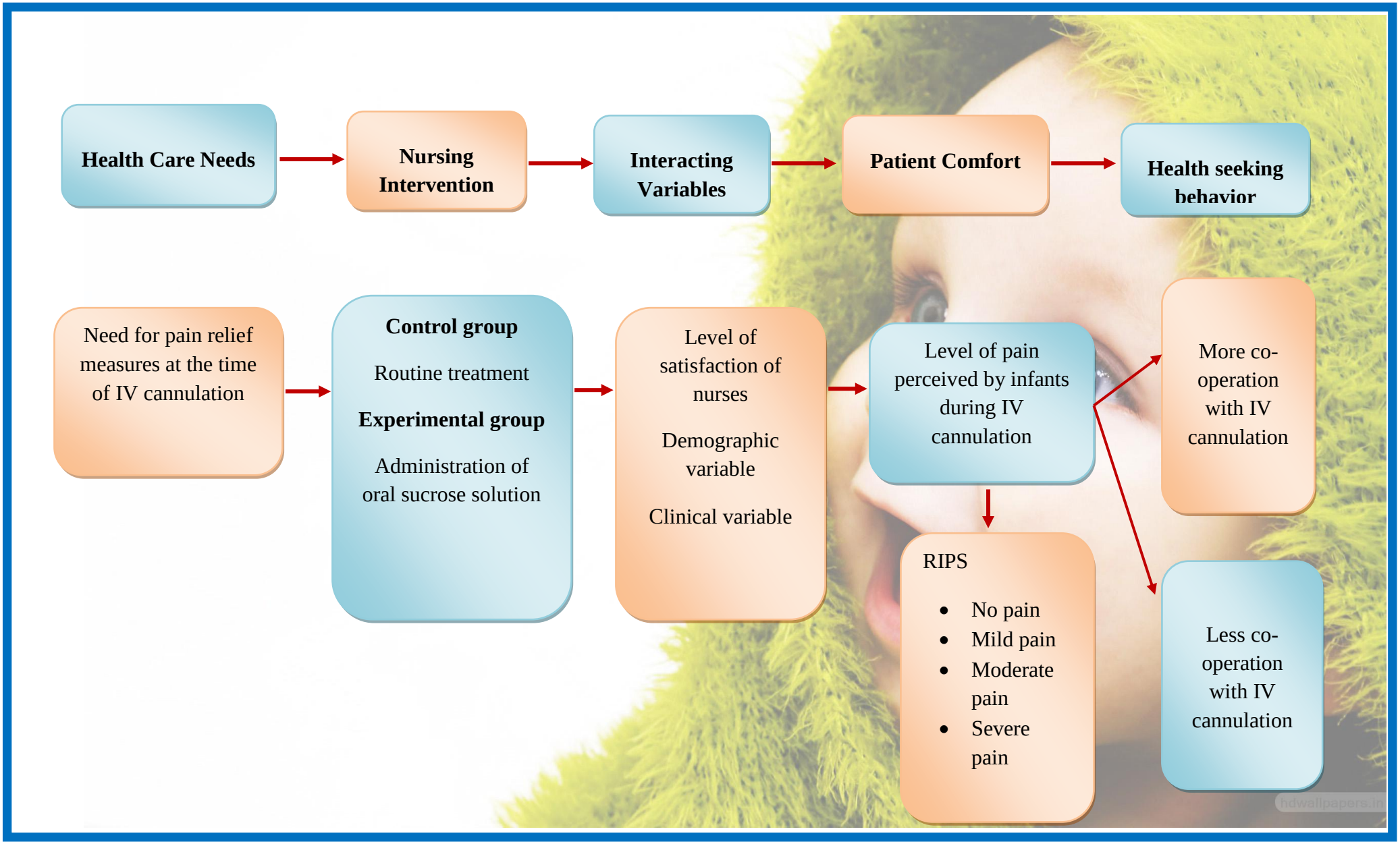

Fig 1: Conceptual Framework Based On Modified Kolcabas Theory of Holistic Comfort

Projected Outcome

Oral sucrose solution before IV cannulation will help the infant to have decreased pain perception and nurse's satisfaction. The intervention will be affordable, safe and easy to administer.

Summary

This chapter has dealt with the background, need for the study, and statement of the problem, objectives, operational definitions, assumptions, null hypotheses, delimitations and conceptual framework.

Organization of the Report

In Chapter II **:** Review Of Literature

In Chapter III **:** Research Methodology includes selection of research approach, research design, setting ,population ,sample, sampling technique, sampling criteria, selection and development of study instruments, validity and reliability of study instrument, pilot study, data collection procedure and plan for data analysis.

In Chapter IV **:** Analysis and Interpretation of data

In Chapter V **:** Discussion

In Chapter VI **:** Summary, conclusion, implication and recommendation.

The report ends with selected references and annexure.

CHAPTER – II

REVIEW OF LITERATURE

Review of literature is an essential component of the research process. It is the critical examination of a publication related to a topic of interest. Review of literature helps to plan and conduct the study in a systematic manner.

This chapter deals with the review of published research studies and form related material for the present study. This helped the investigator in building the foundation of the study.

Review of literature helps the researcher to build on existing work he or she should understand what is already known in the topic (Polit and Hungler 2007).

For the present study literature is reviewed and organized, under two broad headings

- **Literature related to Pain**
- **Literature related to Oral Sucrose Solution**

Literature related to Pain

Goswami (2012) conducted a study "Comparison of Analgesic Effect of Direct Breast Feeding, Oral 25% Dextrose Solution and Placebo during 1st DPT Vaccination in Healthy Term Infants". The objective of the study was to compare analgesic effect of direct breast feeding, 25% dextrose solution and placebo. A prospective, randomized, placebo controlled trial. The primary outcome variable was the duration of cry after

vaccination. Secondary outcome variables were Modified Facial Coding Score (MFCS) and latency of onset of cry. They concluded that direct breastfeeding and 25% dextrose act as analgesic in young infants undergoing DPT vaccination in young infants less than 3 month of age.

Kellogg (2012) conducted a study "association of pain score documentation and analgesic use in a pediatric emergency department". The objective of the study was to find the association between pain score documentation and analgesic administration among pediatric emergency department patients. Records of randomly sampled pediatric patients seen between August 2005 and October 2006 were reviewed. Descriptive statistics and 95% confidence intervals (CIs) were calculated. An initial pain score was documented in 87.4% of 4514 patients enrolled, 797 (17.7%) with severe pain. Of these, 63.1% (95% CI, 59.7%-66.5%) received an analgesic, and 16.7% (95% CI, 14.2%-19.5%) received it parenterally. Documentation of a second pain score was associated with the use of parenteral analgesic and a second dose of analgesic.

The effectiveness of breast feeding on pain experience of infants during the intravenous therapy was conducted among 30 hospitalizes infants (1 to 6 months) from a Children Hospital at Coimbatore. The pain was assessed using FLACC scale. The intensity of pain for the experimental group was observed while mother was feeding the baby. The mean pain score was 1.13 for the experimental group whereas in the control group was 8.92. the mean duration of crying during overall intravenous therapy was 3.29 min for the experimental group and 47.27 min for the control group. The study concluded that breastfeeding was effective in reducing pain perception and crying time of infants while carryout the intravenous therapy (Jasmine,2010)

The effectiveness of administration of oral glucose solution and application of local anesthetic cream prior to intramuscular injection in reducing pain in infants was conducted among 90 infants undergoing immunization injection in child health centre, Madurai. Randomized double blind control group design was use in the study. One group of 30 infants received 1 ml of 25% glucose solution orally and local placebo Vaseline on the skin, whereas another group of 30 infants received lidocaine cream on the skin and orally administered placebo sterile water and one group did not receive any treatment. Pain score in all the groups were measured using Face, Leg, Activity, Cry and Consolability (FLACC) behavioral pain scale. The results showed that pain scores were significantly lower in the group who received glucose at M=5.8 than that of control group at M=11 significant at $p<0.001$(Baby, 2007)

In a community pediatric centre at Ontario, an effect of age, gender and holding on pain response during infants during immunization was studied as randomized control trial among 106 infants aged 2-6 months of age. Infants were positioned either in supine on the examination table or held by a parent during routine immunization in experimental and control group respectively. Facial grimacing scoring system was used. Findings revealed that there was no difference between the supine position and holding contrast it was found that 2 month old infants displayed more pain during immunization than 4 to 6 months old infants (Ipp, 2004)

Literature Related to Oral Sucrose Solution

In 2013, Pandey conducted a study to determine“ role of sucrose in reducing painful response to orogastric tube insertion in preterm neonates”. The objectives of the

study were orogastric tube insertion elicits a painful response in preterm neonates, and the role of oral sucrose in reducing this pain. A double blinded, randomized control trial was conducted in the neonatal intensive care units of a Hospital. The mean Premature Infant Pain Profile (PIPP) scores assessed in experimental group and control group (4.32 vs 5.6, p=0.014). They have concluded that orogastric tube insertion causes pain in preterm and single dose lingual 24 % sucrose may alleviate this pain

Kassab (2012) conducted a study to determine the effectiveness of sweet-tasting solutions for needle-related procedural pain in infants one month to one year of age compared with no treatment, placebo, other sweet-tasting solutions, or pharmacological or other non-pharmacological pain-relieving methods. Randomised controlled trials using a sweet-tasting solution to treat pain in healthy term infants. The result of the study was duration of cry was significantly reduced in infants who were administered a sweet-tasting solution [MD -13.47 (95% CI -16.80 to -10.15)], $P < 0.00001$ compared with water.

The use of oral sucrose has been the most extensively studied pain intervention in newborn care to date. More than 150 published studies relating to sweet-taste-induced calming and analgesia in human infants have been identified, of which 100 (65%) include sucrose. The aim of Harrison's article was to review what is known about the mechanisms of sucrose-induced analgesia; highlight existing evidence, knowledge gaps, and current controversies; and provide directions for future research and practice.

"Hospitalized infants who hurt: a sweet solution with oral sucrose" written by Pasek (2012). Pain is harmful to newborn infants. Oral sucrose is safe, inexpensive and

effective in preventing and reducing pain in hospitalized babies who undergo invasive procedures. The sugar can be used alone or in combination with analgesics and other non pharmacological interventions to provide analgesia. It is incumbent upon nurses to stay abreast of the current evidence and integrate use of oral sucrose into daily pain management practice in emergency, acute, and critical care units.

Harrison (2010) conducted a study on "analgesic effects of sweet tasting solutions for infants- current state of equipoise". The goal of the study was to review published studies of analgesic effects of sweet solutions to ascertain areas with sufficient evidence of effectiveness and areas of uncertainty. They were collected the data from computer data bases. They have identified a total of 298 relevant unique publications involving human infants were identified; 125 (42%) were primary research studies, of which 116 (93%) were randomized controlled trials. Healthy preterm or term newborns were included in 82 studies (65%), and sick or very low birth weight infants were included in 22 (18%). Procedures investigated most frequently were heel lance (49%), venipuncture (14%), and intramuscular injection (14%). Placebo or no-treatment groups were included in 111 studies (89%); in 103 (93%) of those studies.

A study conducted by Harrison (2011) "sweet tasting solutions for reduction of needle related procedural pain in children aged one to 16 years". The objectives of the study was to determine the efficacy of sweet tasting solutions or substances for reducing needle-related procedural pain in children beyond one year of age. Randomized controlled trials (RCTs) in which children from one year up to 16 years of age, received a sweet tasting solution or substance for needle-related procedural pain. Control

conditions included water, non-sweet tasting substances, pacifier, distraction, no treatment, positioning/containment or breastfeeding. They included 330 participants). Results for the toddlers/pre-school children were conflicting. Participants in the sucrose group in one study had significantly lower cry duration and behavioural pain scores, compared with the no intervention group, while crying time did not differ between the sucrose and the no intervention group in the other study. For school-aged children, chewing sweet gum either before, or during the procedure, did not significantly reduce pain scores.

Hatfield (2011) conducted an integrative review on "The analgesic properties of intraoral sucrose". The treatment of pain is an essential component of the clinical and ethical care of infants. Oral sucrose administration has been associated with calming effects and reductions in observed pain behaviours with preterm and term infants aged up to 1 year. The objective of this integrative review is to synthesize findings from published randomized controlled trials evaluating the efficacy and safety of oral sucrose as a pre procedural intervention for mild to moderate procedural pain in infants. Overall, studies indicate that oral sucrose is an effective, safe, convenient, and immediate-acting analgesic for reducing crying time and significantly decreases biobehavioral pain response following painful procedures with infants.

Randomized controlled trial was conducted by Sullivan (2010) to assess the efficacy of oral sucrose combined with swaddling and non-nutritive suck (NNS) as a method for reducing pain associated with retinopathy of prematurity (ROP) screening. Samples were 40 infants undergoing primary eye examination for ROP screening. The control group were swaddled, and received 0.2 ml of sterile water given by mouth using

a syringe and a soother. The intervention group were swaddled, and received 0.2 ml of sucrose 24% given by mouth using a syringe and a soother. The sucrose group had a significantly lower median Neonatal Pain, Agitation and Sedation Scale (N-PASS) score during ROP screening, initially following insertion of the speculum (6.5 Vs 5, p=0.02) and subsequently during scleral indentation (9.5 Vs 7.5, p=0.03). They concluded that ROP screening is a necessary but recognized painful procedure. Sucrose combined with NNS and swaddling reduced the behavioral and physiological pain responses.

The objective of Harrison (2010) was to compare the efficacy of oral sweet solutions to water or no treatment in infants aged 1-12 months during immunization. The method used was randomized controlled trial (RCTs), the data was retrieved through internet searches or manual searches of reference lists. They concluded that infants aged 1-12 months who were administered sucrose or glucose before immunization had moderately reduced incidence and duration of crying.

A study was conducted by Harrison (2009) to evaluate the repeated doses of sucrose in infants continue to reduce procedural pain during prolonged hospitalizations. The aim of the study was to evaluate the analgesic effectiveness of repeated doses of oral sucrose during heel lancing in sick infants over the course of a prolonged hospitalization. Oral sucrose was administered prior to and during all heel lance procedures observed. They concluded the predominantly low behavioral responses to heel lancing and the lack of increase in behavioral pain outcomes suggest the ongoing effectiveness of oral sucrose during painful procedures throughout the infant's hospitalization.

Gaspardo (2008) conducted a study “Is pain relief equally efficient and free of side effects with repeated doses of oral sucrose in preterm neonates. The aim of the study was to determine the efficacy and potential side effects of repeated doses of oral sucrose for pain relief during procedures in NICU. Thirty-three preterm neonates were randomly allocated in blind fashion into two groups, the sucrose group (SG=17) and the control group (CG=16). The responses of neonates to pain and distress were assessed during blood collection on four consecutive assessment days. There was no statistical difference between groups for physiological response. The efficacy of sucrose was maintained for pain relief among preterm neonates with no side effects.

A study conducted by Savaser (2007) to assess the effect of two different methods used during peripheral venous blood collection on pain reduction in neonates”. The purpose of the study was to examine and compare the analgesic effects of breast feeding and sucrose solutions in reducing pain due to venipuncture in term neonates. 102 term infants requiring a venous blood sample for routine screening of phenylketonuria (n=26) and hyperbilirubinemia (n=76) were included in the study. The participants were allocated into one of the sucrose, breast feeding, and control group. Pain was assessed by Neonatal Infant Pain Scale(NIPS).This study has confirmed some well known information that breast feeding and oral sucrose solution have pain reducing effects in infants undergoing venipuncture.

Carbajal (2002) conducted a cross over trial of analgesic efficacy of glucose and pacifier in very preterm neonates during subcutaneous injections. The objectives of this study were to assess the analgesic effect of orally administered glucose and to determine the synergetic analgesic effect of glucose and pacifiers during subcutaneous injections

in very preterm neonates using a validated behavioral acute pain rating scale. They have concluded that a small dose of 0.3 ml of 30% oral glucose has an analgesic effect in very preterm neonates during subcutaneous injections. This effect is clinically evident because it can be detected by a behavioral pain rating scale.

Hatfield (2008) a double blind, randomized study was conducted by Hatfield (2008) to evaluate the effectiveness and age-related changes in analgesia of oral sucrose as a pre procedural intervention during routine immunizations in infants at 2 and 4 months of age. A placebo-controlled clinical trial of 40 healthy term infants scheduled to receive routine immunization. Infants received 24% oral sucrose solution or the control solution of sterile water 2 minutes before routine immunizations. At 2 minutes both sucrose and sterile water showed the highest mean pain score (4.54 and 4.39 respectively) indicating a severe amount of pain. At 5 minutes, the sucrose group returned to near normal at 0.27 while the placebo group remained at 3.02 indicating a percentage difference in mean pain scores relative to sterile water pain scores of 90.9. They have concluded that sucrose is an effective pre procedural intervention for decreasing behavioral pain response in infants after immunizations.

In 2008, Hatfield conducted a study to evaluate the analgesic properties of oral sucrose during routine immunizations of infants at 2 and 4 months of age. It was a prospective, randomized, placebo-controlled clinical trial was conducted at a pediatric ambulatory care clinic. 100 healthy term infants scheduled to receive routine immunizations were recruited, randomly stratified into 2- or 4-month study groups, and further randomly assigned to receive 24% oral sucrose and pacifier or the sterile water control solution. The study preparations were administered 2 minutes before the combined diphtheria-tetanus-acellular pertussis, inactivated polio vaccine, and hepatitis

B vaccine. Haemophilus influenzae type b vaccine was administered 3 minutes after the combined injection, followed by the pneumococcal conjugate vaccine, 2 minutes after the H. Influenza type b injection. They have concluded that oral sucrose is an effective, easy-to-administer, short-acting analgesic for use during routine immunizations.

Greenberg (2002) conducted a study to examine the efficacy of pacifiers and sugar, alone and in combination, for pain management in neonates. It was an experimental design examined pain responses of 84 newborns undergoing heel stick. They were randomly assigned to one of four groups: (a) water-moistened pacifier, (b) sugar-coated pacifier, (c) 2 cc of a 12% oral sucrose solution, or (d) control. They have concluded that offering a sugar coated pacifier during heel stick in healthy neonates reduces pain behaviors more effectively than a water-moistened pacifier, 2 cc of a 12% sucrose solution, or no intervention.

A randomized clinical trial was conducted by Friedman (1999) to test effect of repeated doses of sucrose during heel stick procedure in preterm neonates. The purpose of this randomized clinical trial was to test the efficacy of repeated versus single dose sucrose to decrease pain from routine heel stick procedures in preterm neonates. Infants ($n = 48$) in the first week of life with a mean gestational age of 31 weeks received 0.05 ml of 24% sucrose solution or sterile water by mouth (1) 2 min prior to actual lancing of the heel; (2) just prior to lancing, and (3) 2 min after lancing. The Premature Infant Pain Profile (PIPP) scores were obtained for five 30-second blocks from lancing. Both sucrose groups had lower PIPP scores (single sucrose pain scores, 6.8-8.2, $p = 0.07$; repeated sucrose pain scores, 5.3-6. 2, $p < 0.01$) than water (pain scores 7.9-9.1), and in the last block, the repeated dose had lower scores than the single dose (6.2 vs. 8. 2, $p < 0.05$).

Markestad (1997) conducted a study “use of sucrose as a treatment for infant colic”. The aim of the study was to examine if sucrose has an analgesic effect on infant colic. It was a double blind double crossover study nineteen infants with typical colic were given 2 ml of 12% sucrose or distilled water when crying. The result of the study was twelve infants improved specifically on sucrose and one on placebo ($p<0.01$) and five infants showed non- specific improvement. They have concluded that sucrose has a significant ameliorating effect on infant colic.

Summary

This chapter deals with the review of literature related to problem stated. The literatures presented here were extracted from online journals, manual journals and books. It includes nineteen primary sources and four secondary sources. It helped the researcher to develop tools, collect, organize and analyze the data.

CHAPTER III

RESEARCH METHODOLOGY

The methodology of the research study is defined as the way the data s gathered in order to answer the question to analyze the research problem. It enables the researcher to project the blue print of the research undertaken. The research methodology involves systemic procedure by which the researcher starts from the initial identification of the problem to its final conclusion (Polit & Beck, 2008). The present study was conducted to assess the effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation.

This chapter deals with a brief discussion of different steps undertaken by the researcher for the study. It involves research approach, research design, setting, population, sample and sampling technique, selection of tool, content validity, reliability, pilot study, data collection procedure and plan for data analysis.

Research Approach

Research approach is the most significant part of any research. The appropriate choice of the researcher approach depends on the purpose of the researcher study which is undertaken. Experimental research is an extremely applied form of research and involves finding out how well a program, practice or policy are working (Polit& Beck, 2008)

In this study, the researcher wanted to assess the effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation. After

extensive review of the literature the researcher found that the experimental approach was the best suited approach.

Research Design

Polit & Beck (2008) defined research design as the overall plan for addressing a research question, including specifications for enhancing the study's integrity. A true experimental research design was used for this study. True experimental research is a powerful method available for testing the hypothesis of cause and effect relationship between variables. It has the characteristic feature such as manipulation, control and randomization. Randomization was carried out to select 60 samples and to assign them in the control and experimental group. Oral sucrose solution was given as intervention in the experimental group

In this study, post test only design was adopted. The researcher manipulated the independent variable i.e., oral sucrose solution upon the independent variable, the pain perception in infants was computed. The research design is represented diagrammatically as follows:

Post test only design

R - O1

R X O2

R - Randomization

X - Intervention

O1- Post test in control group

O2- Post test in experimental group

Variables

Independent variable

The variable that is believed to cause or influence the dependent variable is the independent variable (Polit & Beck, 2008). In this study, the independent variable is oral sucrose solution.

Dependent variable

The variable hypothesized to depend on or be caused by another variable is the dependent variable (Polit & Beck, 2008). In this study, the dependent variable is the level of pain perception in infants during IV cannulation.

Attribute variable

Variable that describes the study samples characteristics is termed as attribute variable (Polit & Beck, 2008). In this study, the attribute variables are the demographic variable proforma of the infant and the clinical variable proforma of the infants.

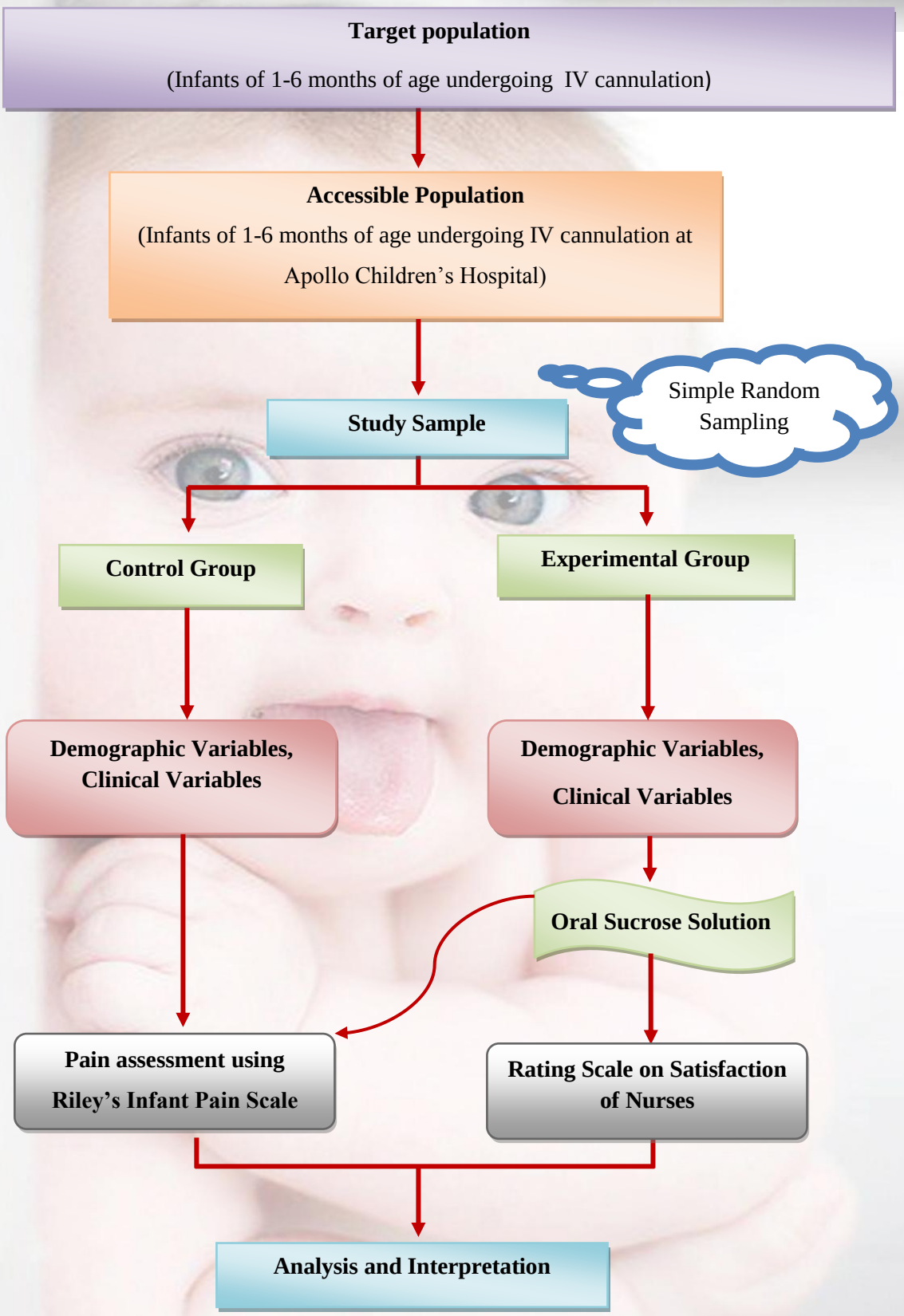

Fig 2: Schematic Representation of Research Design

Research Setting

Research setting is the physical location and conditions in which data collection takes place in study (Polit & Beck, 2008).The study was conducted in Apollo Children's Hospital, Chennai. It is a 80 bedded multi specialty pediatric hospital. It is a multispecialty tertiary centre for paediatrics with facilities like Neonatal Intensive Care Unit), Paediatric Intensive Care Unit(PICU), Cardio-Thoracic Intensive Care Unit(CTICU), Paediatric Emergency Services and subspecialties. In this hospital has both outpatient and inpatient facilities are available all days. Everyday more than 200 children will come to hospital with various problems like respiratory, gastric, neuro, cardiac. IV cannulation is a common medical procedure among children, the researcher collected data from wards and the outpatient blood collection area.

Population

Population is the entire set of individuals or object having some common characteristics (Polit & Beck 2008).

Target population is the aggregate of cases in which a researcher is interested and would like to generalize the study result (Polit & Beck 2008).The target population in this study comprises of all infants, aged 1-6 months who are undergoing IV cannulation.

Accessible population is the aggregate of cases that conforms to designated criteria that are accessible as subject for a study (Polit & Beck, 2008).The accessible population in this study were infants 1-6 months of age undergoing IV cannulation in

Apollo Children's Hospital Chennai who met the inclusion criteria during the data collection period.

Sample

According to Polit and Beck (2008), the sample is a subset of the population selected to participate in a study. A sample consists of infants undergoing IV cannulation, who meet the inclusion criteria at selected hospitals, Chennai were selected for the study. A sample size of 60 infants who met the inclusion criteria were chosen for the study, in that 30 were taken for control group and 30 were taken for experimental group who satisfy the inclusion criteria.

Sampling Technique

Sampling is the process of selecting a portion of the population to represent entire population (Polit & Beck 2008).The participants of the present study will be selected by simple random sampling technique, in which the infants who satisfy the inclusion criteria were selected and numbered as one and two. The infants who are numbered, as one was assigned to control group and two to experimental group.

Sampling Criteria

Inclusion criteria

- Children aged 1month- 6 months
- Both male and female infants
- Children present during the study period
- Children undergoing IV cannulation in Apollo Children's Hospital
- Care givers who are willing to participate

Exclusion criteria

- Having any congenital anomalies
- Who are seriously ill
- Care givers who were not willing to participate in the study

Selection and Development of Study Instruments

The study aimed to evaluate the effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation. Data collection instruments were developed through an extensive review of literature and consultation with experts. The instruments used in the study includes demographic variables proforma, clinical variables proforma, Riley's infant pain scale(RIPS), Rating scale on the level of satisfaction of nurses regarding oral sucrose solution administration during IV cannulation.

Demographic variable proforma for infants

Demographic variable proforma of infants includes age in months, gender, birth weight, type of family, area of residence, family income in rupees per month, occupation, education of the care taker, religion.

Clinical variable proforma for infants

Clinical variable proforma for the infants includes disease condition of child, type of needle used for IV cannulation, indication for IV cannulation, IV cannulation performed by, area of IV cannulation, previous experience of IV cannulation, presence of care provider during the procedure, whether the child is on analgesic.

Riley's Infant Pain Scale (RIPS)

RIPS was developed at Riley Hospital for Children in Indiana. It consists of six parameters: Facial, Body Movements, Sleep, Verbal/ Vocal, Consolability, Response of movements/ Touch. Each parameters score 0,1,2,3 and total score is 18.

Score	Interpretation
0	No pain
1-6	Mild Pain
7-12	Moderate pain
13-18	Severe Pain

Rating scale on level of satisfaction of the nurses regarding oral sucrose solution administration during IV cannulation

The level of satisfaction of nurses regarding oral sucrose solution administration during IV cannulation was measured by rating scale, which comprises 3 categories: character of the research, character of the researcher, effects of intervention on the infant. Rating scale includes 12 items. The responses includes highly satisfied, satisfied, dissatisfied and dissatisfied with the the score 3,2,1,0 respectively. The maximum score is 36.

Score	Percentage	Interpretation
26-36	<70%	Low satisfaction
15-25	40-69%	Moderate satisfaction
<14	<40%	High satisfaction

Psychometric Properties

Validity of study instruments

Content validity is the degree to which an item in an instrument adequately represents the universe of the content (Polit & Beck, 2008).The tools were given for validation to 7 experts in the field of research and nursing. The validators suggested some modification in the demographic variable proforma and clinical variable proforma. The modifications and suggestions of experts were incorporated in the final preparation of the tool.

Reliability of the instruments

The reliability is the consistency with which an instrument measures the attribute which is designed to measure (Polit and Beck, 2008). The reliability of the tool was elicited by using test and re-test method, and was found to be 0.87 which indicated that the tool is highly reliable.

Pilot Study

Pilot study is a miniature version of actual study, in which the instrument is administered to the subject drawn from the sample population. It is a small scale version or trial run done in preparation for major study (Polit and Beck, 2008).The purpose was to find out the feasibility and practicability of the study and to finalize the tool. The pilot study was conducted with 12 infants undergoing IV cannulation, among them 6 in control group and 6 in experimental group in Apollo Children's Hospital, Chennai. On the whole, the intervention was found to be feasible, effective and easy to administer.

Intervention Protocol

In the experimental group, the child was placed in a comfortable position in the bed and 1 ml of oral sucrose solution was administered just before IV cannulation. Pain perception of the infant was assessed using Riley's Infant Pain Scale.

Protection of Human Rights

The researcher obtained permission to conduct the study from the Principal and Head of the Department of Child Health Nursing of Apollo College of Nursing and the Medical superintendent of Apollo Children's Hospital. Informed consent was obtained from parents of infants before collecting the data and confidentiality was maintained throughout the study.

Data Collection Procedure

Data collection is the gathering of information needed to address a research problem (Polit and Beck, 2008).The data was collected from 15/5/13 to 15/6/13 at Apollo Children's Hospital, Chennai. After obtaining permission to conduct study from the Medical Superintendent of Apollo Children's Hospital, the researcher met the Head of the Department and got the approval and valuable suggestions to conduct the study.

In this study, infants who satisfied the inclusion criteria were selected by simple random sampling. The infants who were numbered as one were assigned to control group and two to experimental group. The researcher introduced herself to the parents of the infant and verbal consent was obtained from the participant's parent.

The researcher collected the demographic variables and clinical variables by interviewing the parents and by the help of medical records. The infants in the control group were assessed using a Riley Infant Pain Scale for pain perception during IV cannulation without any intervention. In the experimental group, oral sucrose solution was given 1ml before IV cannulation and post assessment of pain was done immediately by using Riley Infant Pain Scale. In the study, infants were selected randomly as control and experimental group and oral sucrose solution 15 drops was given through dropper for the experimental group infants before IV cannulation. Oral sucrose solution was prepared by taking 24 gm sugar and 100ml of boiled cool water. After the intervention IV cannulation was started and post assessment of pain was done by using Riley's Infant Pain Scale (RIPS). The level of satisfaction of nurse's regarding oral sucrose solution administration during IV cannulation was assesses using a rating scale. The data collection was started at 7.00 am and continued till 2.00 pm.

Problems Faced during Data Collection

The problems faced by the researcher during the study was that certain mothers were not willing to participate in the study.

Plan for Data Analysis

Data analysis is a systematic organization and synthesis of research data and testing of research hypothesis by using the obtained data. (Polit and Beck, 2008) The data analysis was carried out by descriptive statistics like frequency distribution, percentage, mean, standard deviation and inferential statistics like 't' test and 'chi'-square test.

Summary

This chapter dealt with the research methodology .It includes selection of research approach, research design, setting, population, sample, sampling technique, sampling criteria, selection and development of study instruments, validity and reliability of study instrument, pilot study, data collection procedure and plan for data analysis. In the following chapter, analysis is interpreted using descriptive and inferential statistics.

CHAPTER IV

ANALYSIS AND INTERPRETATION

Data analysis is conducted to reduce, organize and give meaning to the data. The results obtained from data analysis require interpretation to be meaningful. Interpretation of data involves examining the results from data analysis forming conclusions, considering the implications for nursing, exploring the significance of the findings and suggesting further studies (Burns and Groove, 2007).

This chapter deals with analysis and interpretation of data collected on a number of issues from various sources. Statistics is a field of study concerned with techniques or methods of data collection, classification, summarising, interpretation, drawing inferences, testing of hypothesis and making recommendations (Mahajan, 2004). Data was collected from 60 children undergoing IV cannulation at Apollo children's hospital, Chennai, among them 30 were in control group and 30 in experimental group to determine the effectiveness of oral sucrose solution administration prior to IV cannulation. The data were analyzed according to the objectives and hypothesis of the study. Analysis of the data was compiled after all the data was transferred to the master coding sheet. The data were analyzed, tabulated and interpreted using appropriate descriptive and inferential statistics.

Organisation of the Findings

The findings of the study were organized and presented under the following headings,

- Frequency and percentage distribution of demographic variables in the control and experimental group of children.
- Frequency and percentage distribution of clinical variables in the control and experimental group of children.
- Frequency and percentage distribution of pain perceived by infants during IV cannulation measured by Riley's Infant Pain Scale in experimental and control group of infants.
- Comparison of mean and standard deviation of pain perception by control and experimental group of infants during IV cannulation measured using Riley's Infant Pain Scale.
- Frequency and percentage distribution of level of satisfaction of nurses on oral sucrose administration during IV cannulation in experimental group.
- Association between selected demographic variable and pain perception of infants in control and experimental group using Riley's Infant Pain Scale.
- Association between selected clinical variables and pain perception of infants in control and experimental group using Riley's Infant Pain Scale.

Table. 1

Frequency and Percentage Distribution of Demographic Variables in the Control and Experimental Group of Infants.

Demographic variables	Control group (n=30)		Experimental group(n=30)	
	n	p	n	p
Age in months				
1-3 months	9	30%	9	30%
4-6 months	21	70%	21	70%
Birth weight in kilo grams of infant				
<2.5	1	3.33%	4	13.33%
2.5-3.5	28	93.33%	22	73.33%
<3.5	1	3.33%	4	13.33%
Type of family				
Nuclear	25	83.33%	25	83.33%
Joint	5	16.66%	5	16.66%
Extended	0	0	0	0
Occupation				
Salaried	19	63.33%	14	46.66%
Self- employed	7	23.33%	10	33.33%
Unemployed	4	13.33%	6	20%
Educational status of the care taker				
Non- literate	0	0	0	0
Primary School	1	3.33%	1	3.33%
Middle School	4	13.33%	6	20%
Higher Secondary	4	13.33%	3	10%
Graduate	21	70%	20	66.66%
Religion				
Hindu	22	73.33%	25	83.33%
Christian	3	10%	2	6.66%
Muslim	5	16.66%	3	10%
Others	0	0	0	0

The data in table 1 reveals that majority of the infants are aged 4-6 months (70%, 70%), with a birth weight of 2.5-3.5 kgs (93.33%, 73.33%) in both control and experimental group respectively. Significant percentage of infants are from nuclear family (83.33%, 83.33%), and their parents are graduates (70%, 66.66%), salaried (63.33%, 46.66%), in both control and experimental group respectively.

Fig.3 shows the percentage distribution of gender of infants undergoing IV cannulation. In the experimental group& control group majority of them are male (63.33%, 63.33%).

Fig.4 shows the percentage distribution of area of residence. Most of the infants in the control and experimental group are from suburban (50%, 33.33%)

Fig.5 shows the percentage distribution of family income in rupees. Most of the infants in the control and experimental group have the family income between <30,000(46.66%, 43.33%)

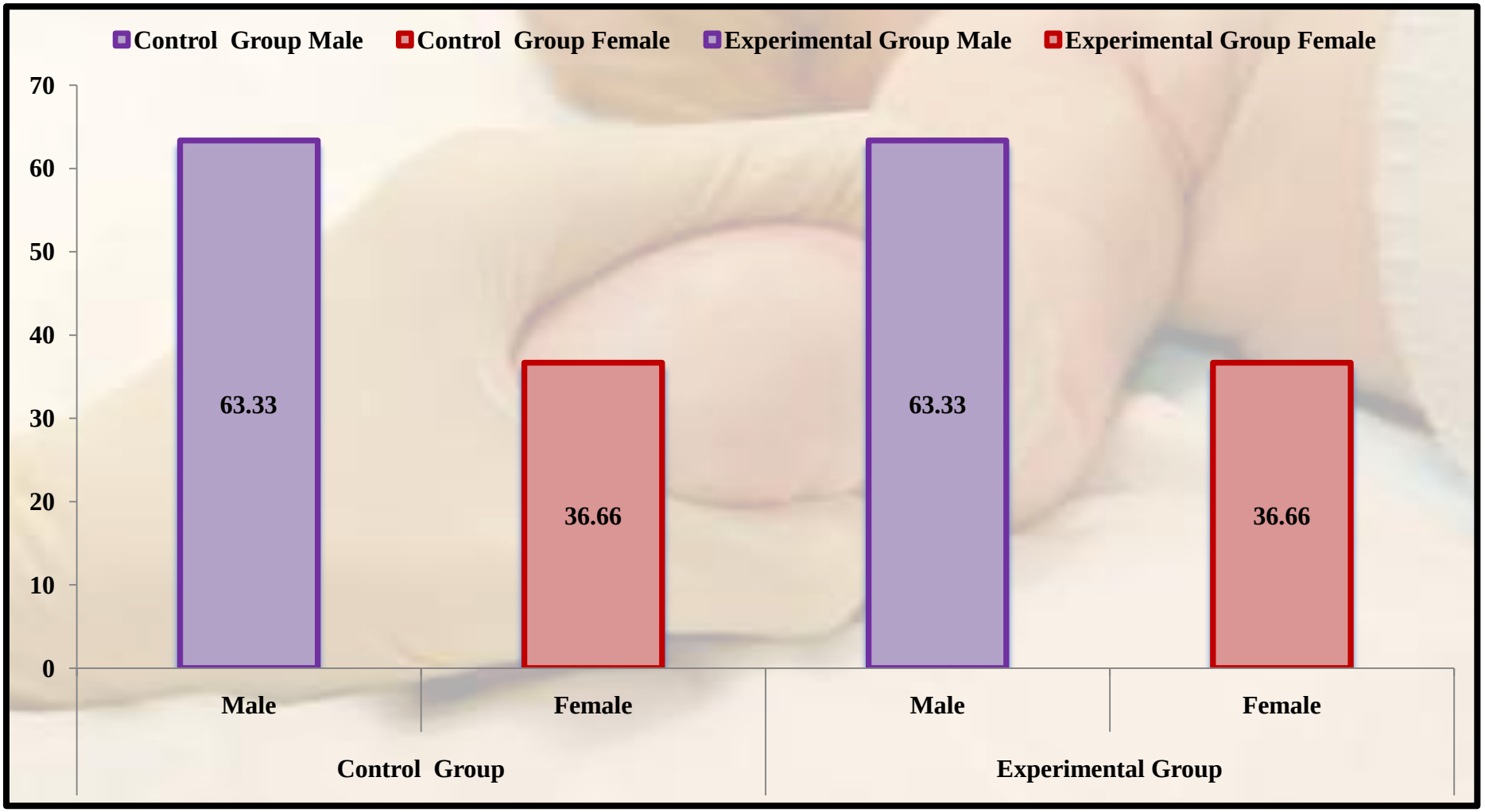

Fig: 3 Percentage Distribution of Gender of Infants in the Control and Experimental group

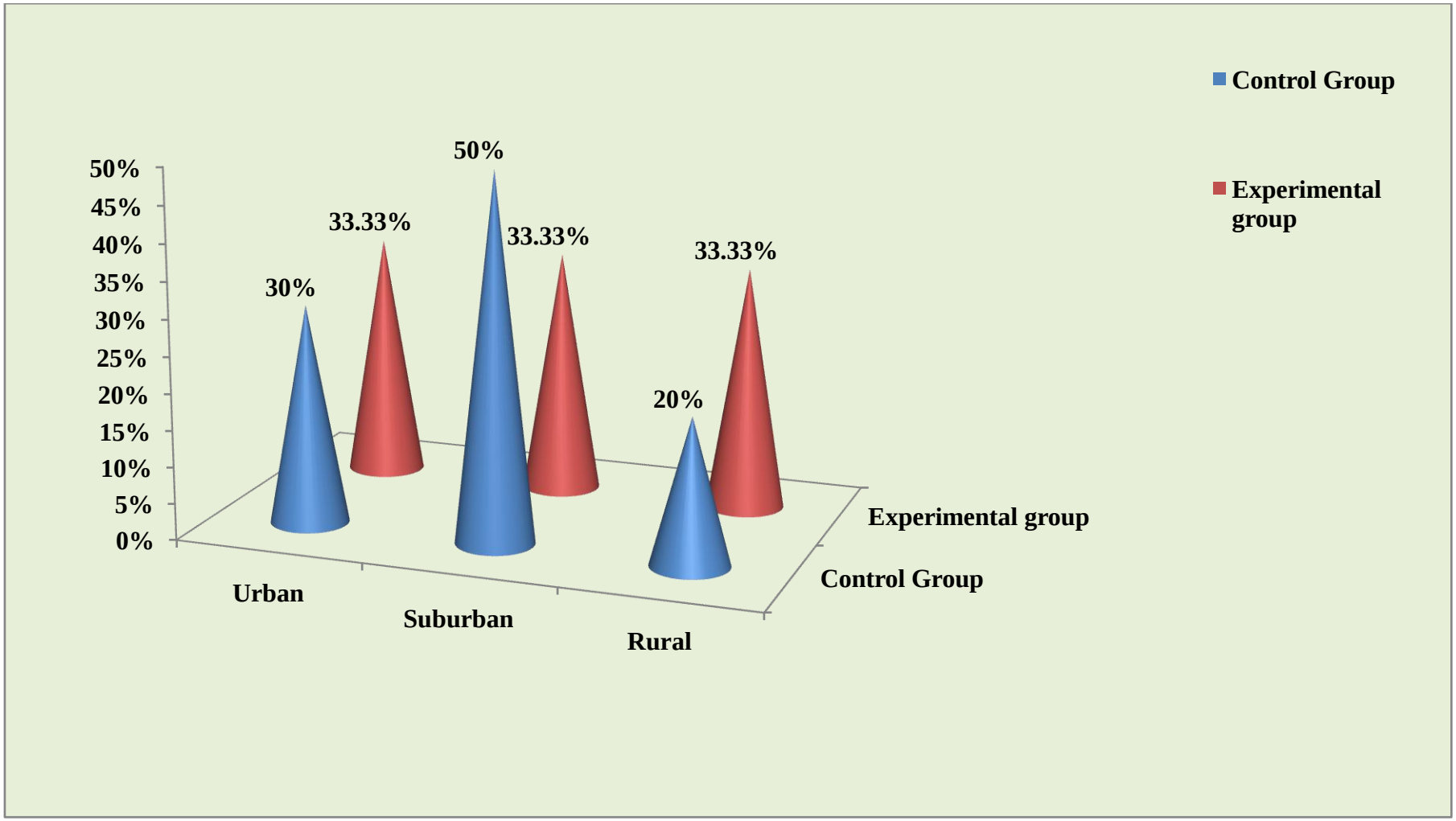

Fig:4 Percentage Distribution of Area of Residence in the Control and Experimental Group of Infants

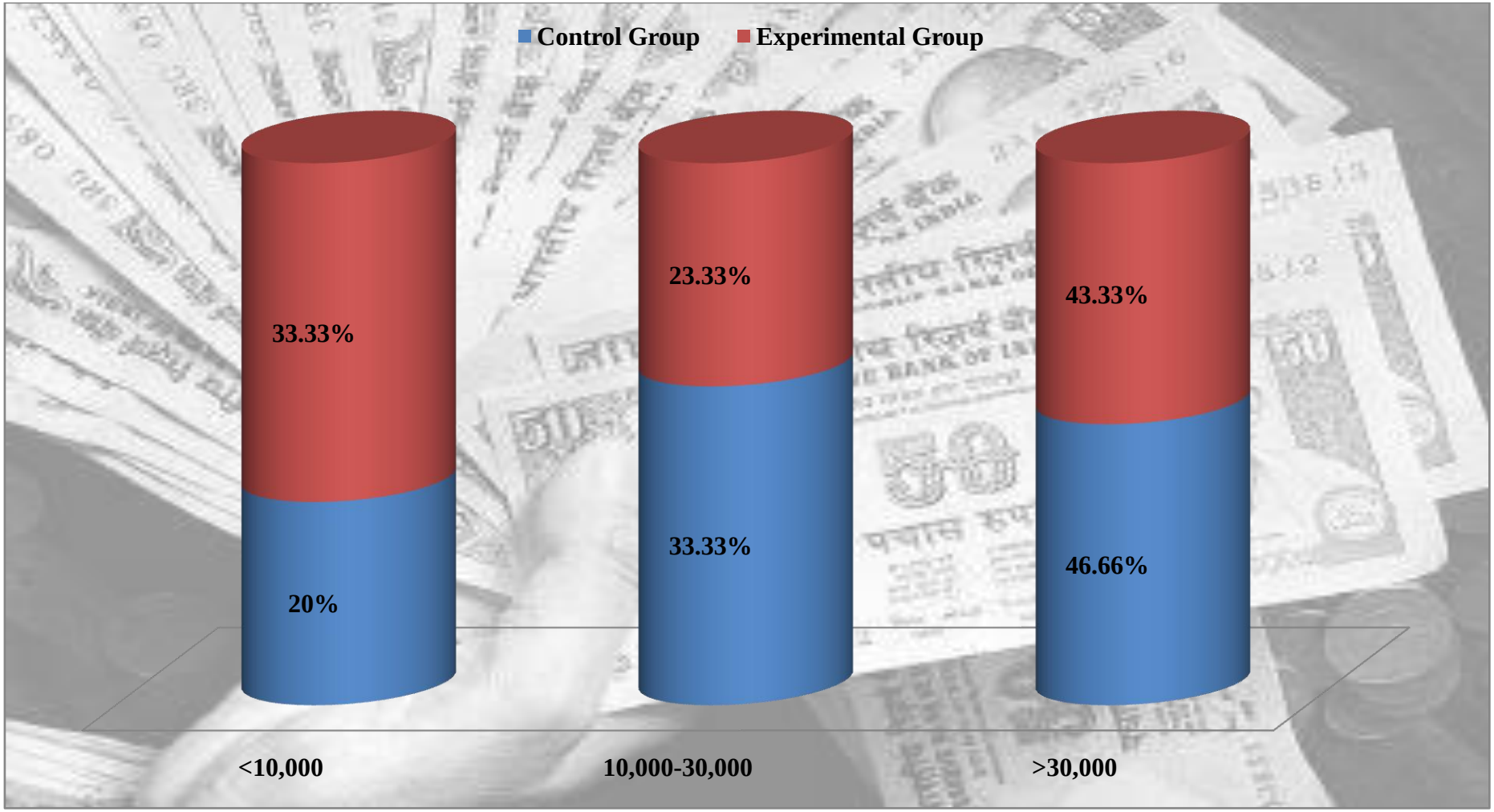

Fig:5 Percentage distribution of Family Income in Rupees in the Control and Experimental Group of Infants

Table. 2

Frequency and Percentage Distribution of Clinical Variables in the Control and Experimental Group of Infants

Clinical Variables	Control Group (n=30)		Experimental Group (n=30)	
	n	p	n	p
Type of needle used for IV cannulation				
Butterfly needle	11	36.66%	8	26.66%
Venflon	19	63.33%	22	73.33%
Indication of IV cannulation				
Intravenous injection	16	53.33%	14	46.66%
Administration of IV fluids	5	16.66%	6	20%
Blood collection	9	30%	10	3.33%
Administration of blood products	0	0	0	0
IV cannulation performed by				
Nurse	29	96.66%	29	96.66%
Physician	1	3.33%	1	3.33%
Technician	0	0	0	0
Previous experience of IV cannulation				
Yes	12	40%	17	56.66%
No	18	60%	13	43.33%
Presence of care provider during the procedure				
Yes	5	16.66%	4	13.33%
No	25	83.33%	26	86.66%
Whether the infant is on analgesic				
No				
Yes. If yes, name of the analgesic	30	100%	30%	100%
	0	0	0	0

The data presented in table 2 shows that most of the infants were cannulated with venflon in (63.33%, 73.33%) and the IV cannulation was performed by nurses (96.66%, 96.66%) in both control and experimental group respectively. Significant percentage of infants had no previous experience of IV cannulation (60%, 43.33%) and in majority of cannulation care providers were not present during the procedure (83.33%, 86.66%) in both control and experimental group respectively.

Fig.6 shows the percentage distribution of disease condition of infants in the control and experimental group. Most of the infants in the control and experimental group have genitourinary disorders (30%, 16.66%).

Fig.7 shows the percentage distribution of size of IV cannula or needle in the control and experimental group of infants. Majority of the infants in the control and experimental group used 24G needle (56.66%, 53.33%)

Fig.8 shows the percentage distribution of the area of IV cannulation in control and experimental group of infants. Most of the infants were cannulated in median cubital vein (40%, 36.66%) in control and experimental group respectively.

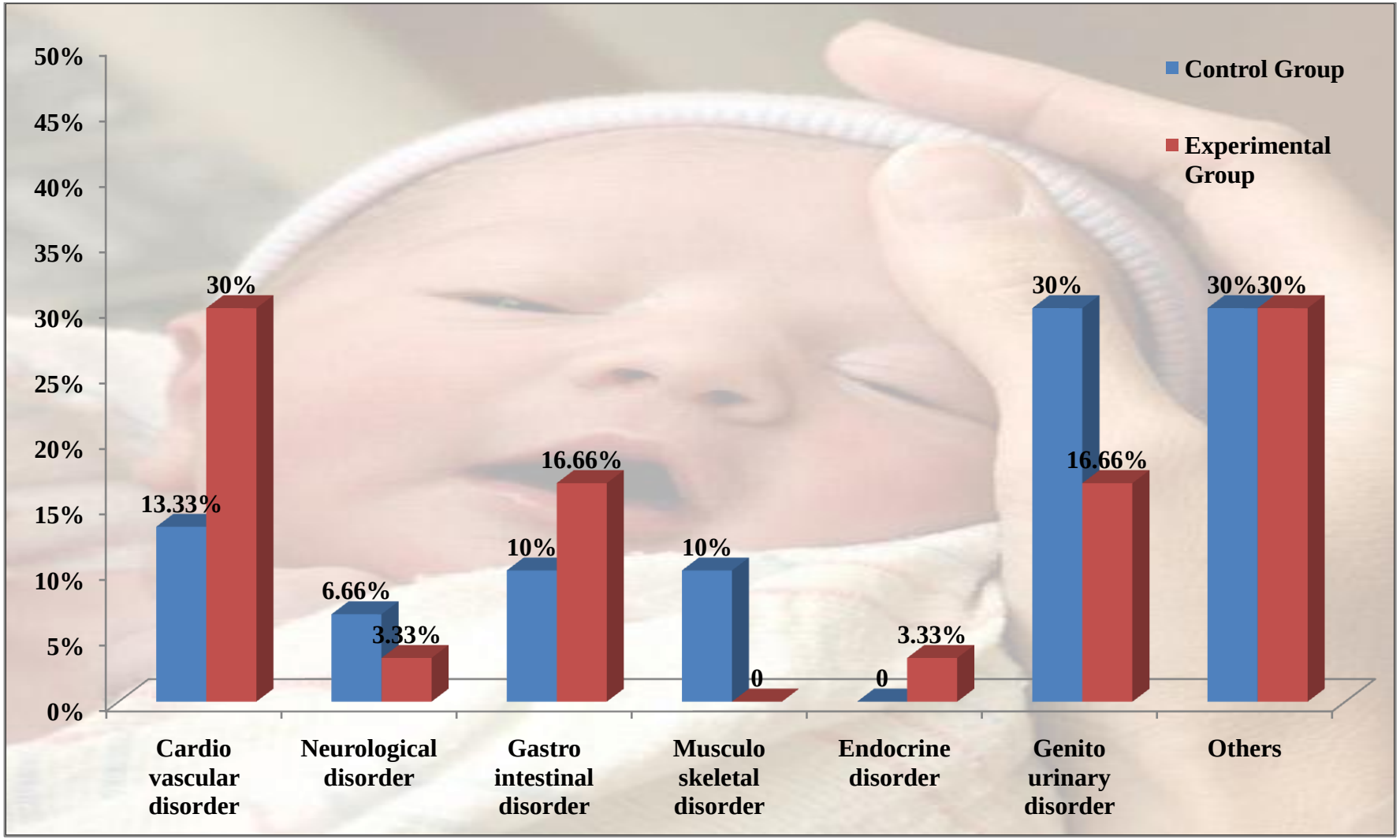

Fig:6 Percentage distribution of Disease Condition of Infants in the Control and Experimental Group

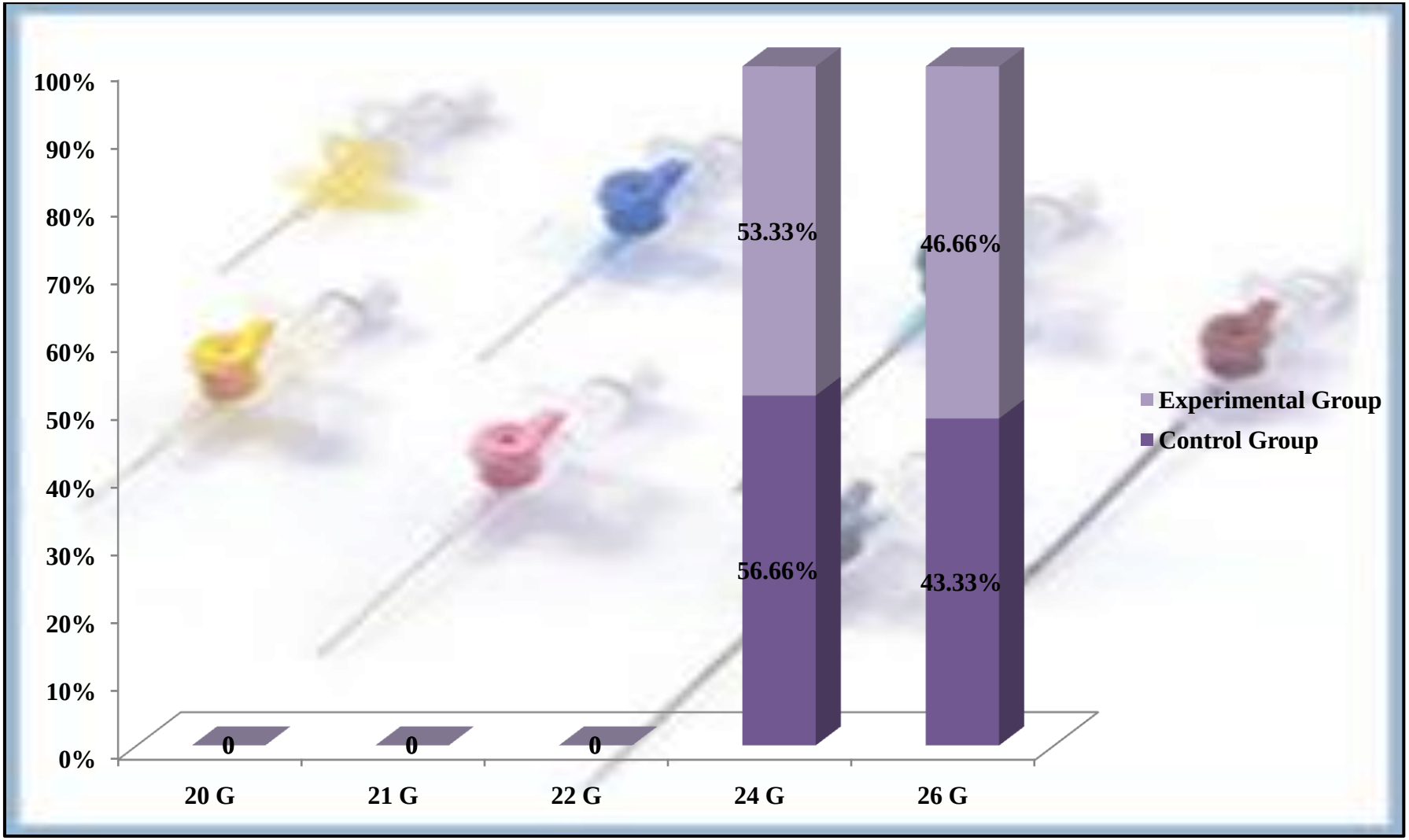

Fig:7 Percentage Distribution of Size of IV cannula or needle in the Control and Experimental group of Infants

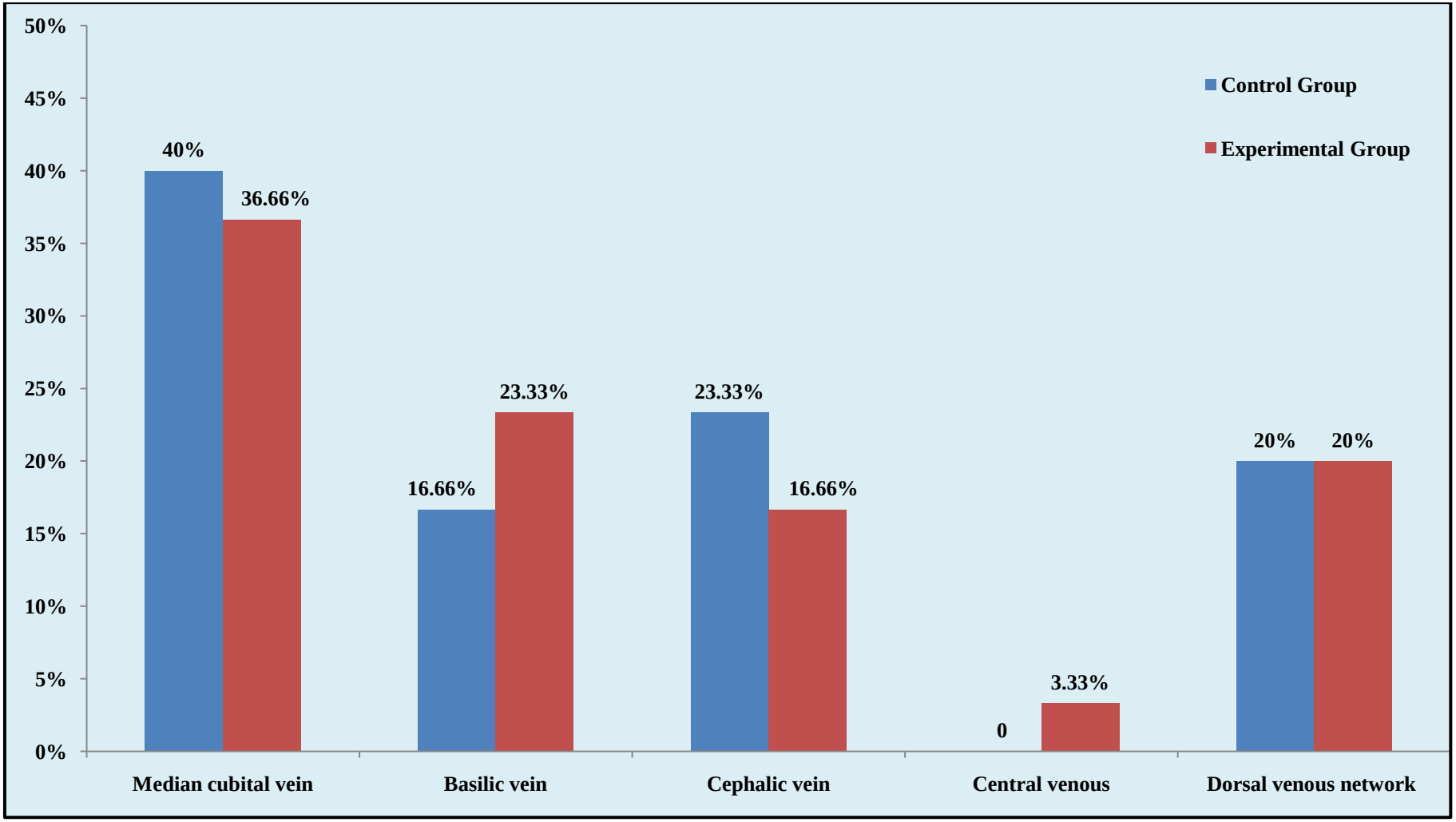

Fig:8 Percentage Distribution of Area of IV cannulation in the Control and Experimental group of Infants

Table. 3

Frequency and Percentage Distribution of Pain Perception of the Infants During IV Cannulation by Riley's Infant Pain Scale.

Pain perception	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
No pain	2	6.66%	5	16.66%
Mild pain	3	10%	15	50%
Moderate pain	9	30%	8	26.66%
Severe pain	16	53.33%	2	6.66%

The data presented in the table 3 reveals that majority of the children in control group had severe pain (53.33%) where as in experimental group (50%) had mild pain. Hence null hypothesis H_{O1} is rejected.

Table. 4

Comparison of Mean and Standard Deviation of Pain perception among Control and Experimental Group of Infants Undergoing IV cannulation

Group	N	M	SD	t value
Control group	30	11.36	3.77	21.3***
Experimental group	30	5.6	12.44	

***p<0.001

The data in the table 4 depicts that the mean and standard deviation of control and experimental group of infants was 11.36, 3.77, 5.6 and 12.44 respectively. The 't' value of 21.3 is highly significant at p< 0.001 level of significance. Hence null hypothesis H_{O2} is rejected.

Fig. 9 depicts the majority of the nurses were highly satisfied (90%) with oral sucrose administration during IV cannulation

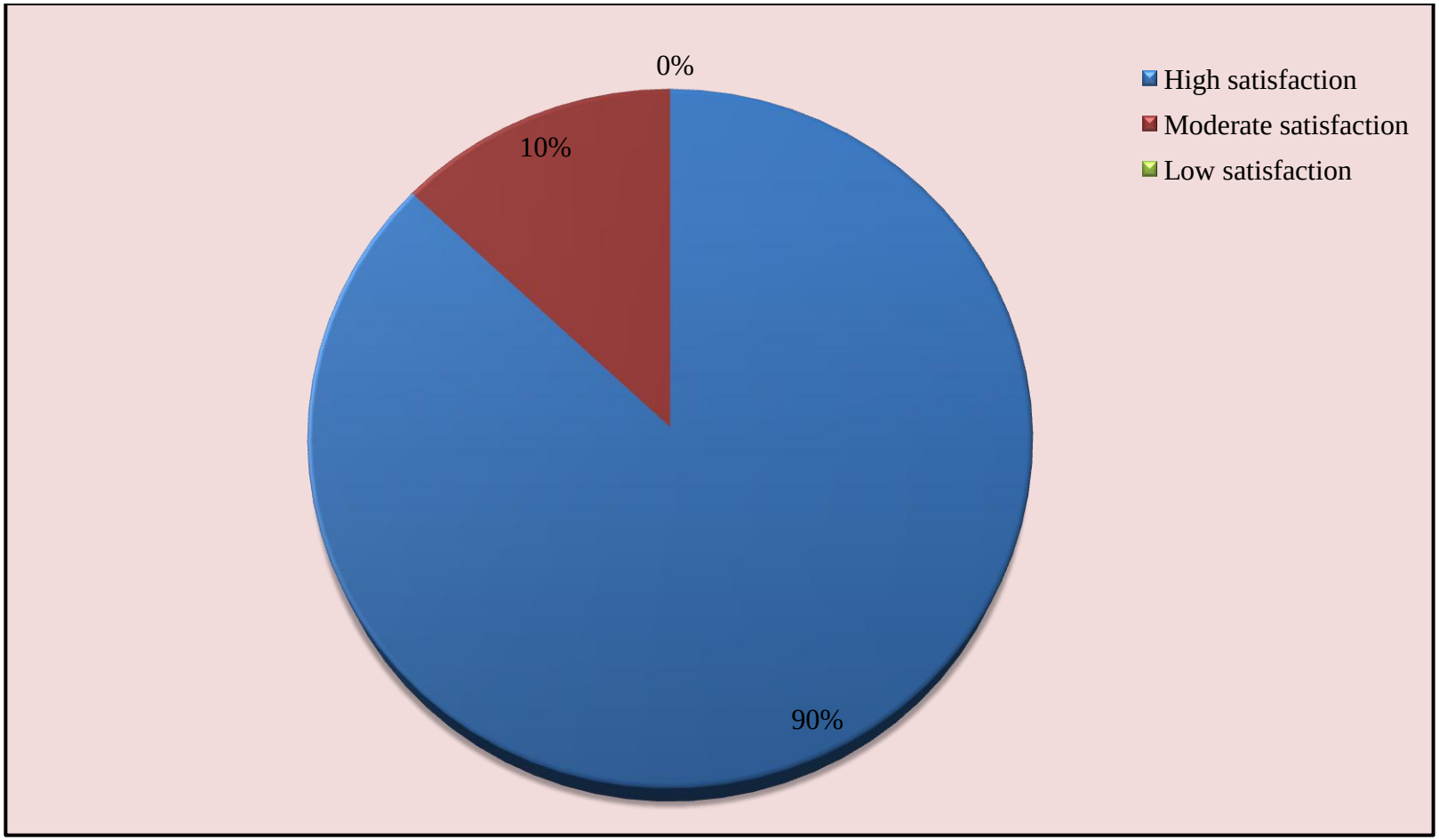

Fig: 9 Percentage Distribution of Level of Satisfaction of Nurses

Table .5

Association between Selected Demographic Variable and Pain perception of Infants in Control Group and Experimental Group Using Riley's Infant Pain Scale.

Demographic variables	Control group Pain perception score		χ^2	Experimental group Pain perception score		χ^2
	Up to mean	Above mean		Upto mean	Above mean	
Age in months						
1-3	3	6	0.48	6	5	20.06***
4-6	4	17	df=1	9	10	df=1
Gender						
Male	4	15	0.58	10	8	0.4
Female	3	8	df=1	5	7	df=1
Birth weight						
≤2.5	0	1	1.14	2	2	0.24
≥2.5	7	22	df=1	14	12	df=1
Type of family						
Nuclear	6	20	0.06	14	12	0.32
Joint	1	3	df=1	3	1	df=1

***p<0.001

Table 5 shows that there was no association between any of the demographic variable and pain perception (***p<0.001) in control group. In the experimental group age of the infant and pain perception has an association. Hence the null hypothesis H_{O3} is partially rejected with regard to the age in the experimental group of infants and retained with regard to other demographic variables in control and experimental group of infants.

Table 6

Association between Selected Clinical Variable and Pain perception of Infants in Control Group and Experimental Group Using Riley's Infant Pain Scale

Clinical variables	Control group Pain perception score			Experimental group Pain perception score		
	Up to mean n	Above mean n	χ^2	Upto mean n	Above mean n	χ^2
Disease condition						
Genito- urinary problems	1	8	0.82	3	2	0
Others	6	15	df=1	12	13	df=1
Type of needle used						
Butterfly needle	3	7	0.114	7	3	2.24
Venflon	4	16	df=1	8	12	df=1
Size of cannula used						
24G	3	14	0.49	8	8	0.12
26G	4	9	df=1	7	7	df=1
Presence of care provider	1	4	3.35	5	0	9.6**
Yes	6	19	df= 1	10	15	df=1
No						

**p<0.01

From the Table 6, it could be inferred that there was no significant association between clinical variables and pain perception ($p<0.05$) in the control group. In the experimental group there was an association between presence of care provider and pain perception. Hence the null hypothesis H_{O4} is partially rejected with presence of care provider during the procedure in the infants in experimental group and completely retained with regard to other clinical variables in control and experimental group of infants.

Summary

This chapter dealt with the analysis and interpretation of the data obtained by researcher. The analysis of data using descriptive and inferential statistics clearly revealed the effectiveness of oral sucrose administration during IV cannulation and satisfaction of nurses regarding the intervention. In the following chapter interpretation of study findings are discussed in detail.

CHAPTER V

DISCUSSION

Statement of the Problem

An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai.

Objectives of the Study

1. To determine the extent of pain perceived by the control and experimental group of infants during IV cannulation.
2. To determine the effectiveness of oral sucrose solution upon pain perception of experimental group of infants during IV cannulation.
3. To determine the association between selected demographic variables and pain perception of control and experimental group of infants during IV cannulation.
4. To determine the association between selected clinical variables and pain perception of control and experimental group of infants during IV cannulation
5. To determine the level of satisfaction of nurses in experimental group of infants during IV cannulation.

The conceptual framework for the study was based on “Katharine Kolcaba theory of holistic comfort (1994)” given by “Katharine Kolcaba” which was modified for the present study. A true experimental post test only design was used

in this study. The present study was conducted in Apollo Children's Hospital, Chennai. A sample size of 60 children who met the inclusion criteria were chosen for this study of which 30 were taken for the control group and 30 for the experimental group using simple random sampling.

The study variables were pain perception of the infants and oral sucrose solution. An extensive review of literature and guidance by experts formed the foundation to the development of Demographic variables proforma, Clinical variables proforma, Riley's Infant Pain Scale and Rating Scale on the level of satisfaction about oral sucrose administration before IV cannulation.

The data collection tools were validated and the reliability was established through test-retest method. After the pilot study, the data for the main study was collected by interviewing the parents, nurses and by self observation.

The researcher collected the demographic variables and clinical variables by interviewing the parents and by the help of medical records. The infants in the control group were assessed using a Riley Infant Pain Scale for pain perception during IV cannulation without any intervention. In the experimental group, oral sucrose solution was given 1ml before IV cannulation and post assessment of pain was done immediately by using Riley Infant Pain Scale.

After the intervention IV cannulation was started and post assessment of pain was done by using Riley's Infant Pain Scale (RIPS). The level of satisfaction of nurse's regarding oral sucrose solution administration during IV cannulation

was assesses using a rating scale. The data analysis was carried out by descriptive statistics and inferential statistics.

Demographic variables distribution

Majority of the infants in the control and experimental group were in the age group of 4-6 months (70%, 70%), males (63.33%, 63.33%). Regarding the gender, majority 63.33% were males in control group and in experimental group 63.33% were males and 36.66% in control group and 36.66% in experimental groups were females. Findings confirm that sex ratio over the decades in India has been deteriorating. The 2011 census report showed the sex ratio in India is 940 females /1000 males which is consistent with the obtained data.

The birth weight of infants in the control and experimental group were between 2.5- 3.5 kgs (93.33%, 73.33%), from nuclear family (83.33%, 83.33%). The researcher felt that as the responsibility to care for other family members were less in nuclear families, it promotes the parents to seek better care for their children. A study conducted by Rai et al. (1992) says that the prevalence of behaviour problems are higher in children in nuclear family than children from joint families. Hence it is the responsibility of nurses to give special care while preparing such infants for IV cannulation or any procedures.

Significant percentage of infants in the control and experimental group were resided in suburban area (50%, 33.33%). Even though the infants are distributed in different areas of residence they seek good medical advice and are aware about the advantages of taking adequate medical attention.

Majority of infants in control and experimental group had a family income between <30,000 rupees (46.66%, 43.33%), occupation is salaried (63.33%, 46.66%), educational status was graduate (70%, 66.66%), belonging to Hindu religion (73.33%, 83.33%) in control and experimental group of children respectively. Pain behaviours vary widely and may be culturally bound. It has been suggested that "people in Eastern cultures have higher pain tolerance than those in the West. Nayak et al. (2000). With the increase in global migration, nurses need to develop increased sensitivity to the influence of culture on pain perceptions and behaviours.

Clinical variables

Most of the infants in the control and experimental group were having genitourinary disorder (30%, 16.66%) and other disorders (30%, 30%). This was supported by Poalo (2005) who conducted a longitudinal study in Danish children which revealed that prevalence of genitourinary problems is increasing at a rate of 3.8 per 1000 children.

The type of the needle used was venflon (63.33%, 73.33%). The size of the cannula or needle was 24 G (56.66%, 53.33%). Major indication for the IV cannulation was IV injection (53.33%, 46.66%), IV cannulation was performed by (96.66%, 96.66%) nurses, area of cannulation was median cubital vein (40%, 36.66%). Most of the infants had no previous experience of IV cannulation (60%, 43.33%). Presence of care provider during the procedure was no in most of the cases (83.33%, 86.66%). The child was not on analgesics during procedure (100%, 100%) in the control and experimental groups respectively. It is noticeable that most of the IV cannulation was performed by the nurses but in certain

institutions according to their policies and protocols IV cannulation is done only by a Physician or infusion nurses.

The first objective of the study was to determine the extent of pain perceived by the control and experimental group of infant during IV cannulation

The level of pain perceived by infant after IV cannulation in control and experimental group was measured by using Riley's Infant Pain scale. Majority of the children in control group had severe pain (53.33%) where as in experimental group (50%) had mild pain.

The health care provider should accommodate for the baby's comfort, safety, age, activity level, and the site of administration when considering baby's positioning. Staff nurses were encouraged to hold the baby during procedure. Staff nurses participation showed increase in infant's comfort. Sometimes, parents may assist for the procedure which reduces the stress in infant and gives a secure feeling.

The pain perception of infant was assessed using Riley's Infant Pain Scale in both control and experimental group of infants. The mean and standard deviation of pain score in control group is M=11.36, SD=3.77 and that of experimental group is M=5.6, SD= 12.44 which indicate experimental group had lower level of pain perception in comparison with control group. The experimental group showed a significant difference ($p<0.001$) in the mean and standard deviation of pain perception.

Painful stimulation occurs due to IV cannulation and other procedure is unavoidable. But the transmission of the stimuli can be blocked by various distraction techniques in infants and children. As one of the measures, the infant in the experimental group were administered 24% oral sucrose solution before administration of injections and the findings revealed that the pain perception is reduced in infants when compared to the control group of infants. Hence, the null hypothesis $H_{01,}$ was rejected.

The second objective of the study was to determine the effectiveness of oral sucrose upon pain perception of experimental group of infants during IV cannulation

The effectiveness of oral sucrose administration upon pain perception among the experimental group of infants during IV cannulation was assessed statistically using the independent't' test. The mean and standard deviation of pain score was lower in experimental group (M=11.6, SD= 3.77) of who received IV cannulation before IV cannulation when compared to the control group of infants (M=5.6, SD=12.44). The difference was statistically significant at $p<0.001$, the 't' value is 21.3 . The result could be attributed to the effectiveness of oral sucrose administration upon pain perception of infants during IV cannulation.

The mechanism of oral sucrose solution is an orally mediated increase in endogenous opioid. Pain in infants is known to cause adverse short and long-term effects. A host of physiological, biochemical and behavioural responses have been noted during painful episodes. When exposed to prolonged pain, infants enter a state of passivity with few, if any, body movements; they have an expressionless face, decreased heart rate and respiratory variability, and decreased oxygen

consumption, all suggestive of a marked conservation of energy. Prolonged or repeated pain also increases the response elicited by future painful stimuli (hyperalgesia) and even by usually non-painful stimuli (allodynia). The consequences include altered pain sensitivity (which may last into adolescence) and permanent neuro-anatomical, behavioural, emotional and learning disabilities. Studies support the theory that sucrose and pain relief are interrelated through the body's endogenous opioid system that provides natural analgesia. Hence, the null hypothesis H_{02} was rejected

The researcher concludes that the findings must be disseminated so that evidence based knowledge can be utilized in the clinical setting to reduce the pain perception of infants during IV cannulation.

The third objective of the study was to find out the association between selected demographic variables and pain perception by the control and experimental group of infant during IV cannulation.

Chi-square test was used to find out the association between the selected demographic variables and pain perception of infants. It is inferred that there was no significant association between demographic variables like age, gender, birth weight, type of family and pain perception at $p<0.001$ in control group.

Studies with infants indicate that the pain-reducing qualities of sucrose appear to be in its sweet taste, and do not rely on systemic absorption. In a double-blind crossover study of 30 preterm infants of 32 to 36 weeks of gestation, sucrose effectively reduced pain when given by mouth but not when administered through a nasogastric tube. Ramenghi, Evans, & Levene, (1999). In another study that

examined the action of sweet-tasting solutions, 60 full-term newborns were assigned randomly to four treatment groups. Each infant received one of the following: sterile water, 25% sucrose, 50% sucrose, or Calpol (a sweet-tasting solution). The artificially sweetened solution was as effective as both sucrose solutions in relieving pain, which suggests that the analgesic effect was due to sweet taste and not systemic absorption of sucrose products. Age of the child has a significant relation to pain perception, as the age decreases the oral sucrose effectiveness is more.

It is also found that there was a significant association between the age of the infant, and pain perception of the children at $p<0.001$ in experimental group and no significant association between other demographic variable like gender, birth weight, type of family and pain perception in experimental group during IV cannulation. Hence, the null hypothesis H_{03} was partially rejected with regard to the age of the infant in experimental group of infants and retained with regard to other demographic variables in control and experimental group of infants.

The fourth objective of the study was to find out the association between selected clinical variables and pain perception by the control and experimental group of infants during IV cannulation

Chi square test was used to find out the association between the selected clinical variables and the pain perception of infants. It is inferred that there was no significant association between clinical variables like disease condition, type of needle used, size of cannula, presence of care provider during procedure and pain perception at $p<0.01$ in control group.

Infants undergone IV cannulation for various purpose and hence the association between the disease condition, type of needle and pain perception was not identified. Damage to the tissue will definitely cause painful stimuli. Previous history of hospitalization does not influence the pain perception. Presence of care provider during procedure reduce the pain perception to some extent. A psychoanalytical study done by Julia Peres Pinto concluded that the nursing team must consider the mother's participation in painful procedures during hospitalization. This participation is presented in the sense that, even when not being present at the time of the puncture, the mother can help the child, based on their affective bond, making difficult moments familiar and bearable. Thus irrespective of the clinical variable most of the infants had same pain perception. Hence it is necessary to provide pain reducing intervention to all the infants undergoing IV cannulation.

It was inferred that there was a significant association between the presence of care provider during procedure and pain perception at $p<0.01$ in the experimental group of infants and no significant association between other clinical variable and pain perception in experimental group of infants. Hence, the null hypothesis H_{04} was partially rejected with presence of care provider during procedure in the infants in experimental group and completely retained with regard to other clinical variables in control and experimental group of infants.

The fifth objective of the study was to determine the level of satisfaction of nurses in experimental group of infants during IV cannulation.

The level of satisfaction of nurses regarding oral sucrose administration prior IV cannulation, is noted that, majority of the nurses (90%) were highly

satisfied. It indicates that the nurses were also under stress and anxious regarding the painful experience of infant during the IV cannulation or any other procedure. The effective pain management measure which is safe, simple, cost effective and easy to administer helps the nurses to have higher levels of satisfaction. These findings can be disseminated to the hospitals to be implemented.

Researcher concludes that 24% oral sucrose administration can be followed as a non pharmacological pain intervention during IV cannulation for infants in the hospital as it is simple, safe, cost effective and easier to administer. The finding can be disseminated as evidence based practice and the effectiveness can be implicated in nursing education.

Summary

This chapter dealt with the objectives of the study, major finding such as the demographic variable and clinical variable of infants, mean and standard deviation of pain score in control and experimental group of infants, association between the selected demographic variable and clinical variable and the pain perception in infants and level of satisfaction of nurses on oral sucrose administration during IV cannulation.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

Effective pain management is every child's right. Acute pains in children are associated with medical conditions and procedures that can be prevented or greatly relieved. The heart of the project lies in reporting the findings. This is most creative and demanding part of the study. This chapter gives a brief account of present study including drawn from the findings, nursing implications of the study and recommendations.

Summary

An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai.

Objectives of the Study

1. To determine the extent of pain perceived by the control and experimental group of infants during IV cannulation
2. To determine the effectiveness of oral sucrose solution upon pain perception of experimental group of infants during IV cannulation
3. To determine the association between selected demographic variables and pain perception by the control and experimental group of infants during IV cannulation

4. To determine the association between the selected clinical variables and pain perception by the control and experimental group of infants during IV cannulation.
5. To determine the level of satisfaction of nurses in experimental group of infants during IV cannulation.

Null Hypothesis

H_{01} : There will be no significant difference in the pain perception of the control and experimental group of infant during IV cannulation

H_{02} : There will be no significant difference between the pain perception of infant and administration of oral sucrose solution

H_{03} : There will be no significant association between selected demographic variable and pain perception in control and experimental group of infant during IV cannulation

H_{04} : There will be no significant association between selected clinical variable and pain perception in control and experimental group of infant during IV cannulation

The conceptual framework for the study was based on "Katharine Kolcaba theory of holistic comfort (1994)" given by "Katharine Kolcaba" which was modified for the present study. A true experimental post test only design was used in this study. The present study was conducted in Apollo Children's Hospital, Chennai. A sample size of 60 children who met the inclusion criteria were chosen for this study of which 30 were taken for the control group and 30 for the experimental group using simple random sampling.

The study variables were pain perception of the infants and oral sucrose solution. An extensive review of literature and guidance by experts formed the foundation to the development of Demographic variables proforma, Clinical variables proforma, Riley's Infant Pain Scale and Rating Scale on the level of satisfaction about oral sucrose administration before IV cannulation.

The data collection tools were validated and the reliability was established through test-retest method. After the pilot study, the data for the main study was collected by interviewing the parents, nurses and by self observation.

The researcher collected the demographic variables and clinical variables by interviewing the parents and by the help of medical records. The infants in the control group were assessed using a Riley Infant Pain Scale for pain perception during IV cannulation without any intervention. In the experimental group, oral sucrose solution was given 1ml before IV cannulation and post assessment of pain was done immediately by using Riley Infant Pain Scale.

After the intervention IV cannulation was started and post assessment of pain was done by using Riley's Infant Pain Scale (RIPS). The level of satisfaction of nurse's regarding oral sucrose solution administration during IV cannulation was assesses using a rating scale. The data analysis was carried out by descriptive statistics and inferential statistics.

The Major Findings of the Study

Demographic variables of Infants

Majority of the infants were in the age in between 4-6 months (70%,70%), males (63.33%, 63.33%), birth weight 2.5 – 3.5 kilograms (93.33%, 73.33%),

belongs to nuclear family (83.33%, 83.33%), were from suburban area (50%, 33.33%), family income <30,000 rupees (46.66%, 43.33%), occupation is salaried (63.33%, 46.66%), educational status was graduate(70%, 66.66%), belonging to Hindu religion (73.33%, 83.33%) in control and experimental group of children respectively.

Clinical variables

Most of the infants are having genitourinary disorder (30%, 16.66%) and other disorders(30%, 30%). The type of the needle used were venflon (63.33%, 73.33%). The size of the cannula or needle were 24 G (56.66%, 53.33%). Major indication for the IV cannulation was IV injection (53.33%, 46.66%), IV cannulation was performed by nurse (96.66%, 96.66%), area of cannulation was median cubital vein (40%, 36.66%). The infants previous experience of IV cannulation was no (60%, 43.33%). Presence of care provider during the procedure was no in most of the cases (83.33%, 86.66%). The child was not on analgesic during procedure (100%, 100%) in the control and experimental groups respectively.

Determine the extent of pain perceived by the control and experimental group of infants during IV cannulation

The mean and standard deviation of pain perception in infants in the control and experimental group is Mean=11.36, SD=3.77 and experimental group is Mean= 5.6, SD= 12.44 respectively. The 't' value of 21.3 is highly significant at $p<0.001$ level of significance. The null H_{01} there will be no significant difference in the pain perception of the control and experimental group of infants during IV cannulation was rejected.

Determine the effectiveness of oral sucrose solution upon pain perception of experimental group of infants during IV cannulation

The effectiveness of oral sucrose administration upon pain perception among the experimental group of infants during IV cannulation was assessed statistically using the independent‘t’ test. The mean and standard deviation of pain score was lower in experimental group (M=11.6, SD= 3.77) of who received IV cannulation before IV cannulation when compared to the control group of infants (M=5.6, SD=12.44). The difference was statistically significant at P<0.001, the ‘t’ value is 21.3. Hence, the null hypothesis $H_{02,}$ there will be no significant difference between the pain perception of infant and administration of oral sucrose solution was rejected.

Find out the association between selected demographic variables and pain perception by the control and experimental group of infant during IV cannulation.

Chi-square test is used to find out the association between the selected demographic variable and the pain perception of infants. It is inferred that there was no significant association between demographic variable like age, gender, birth weight, type of family and pain perception at p<0.001 in control group. Hence, the null hypothesis H_{03} was partially rejected with regard to the age of the infant in experimental group of infants and fully retained with regard to other demographic variables in control and experimental group of infants.

Find out the association between selected clinical variables and pain perception by the control and experimental group of infants during IV cannulation

Chi square test is used to find out the association between the selected clinical variable and the pain perception of infants. It is inferred that there was no significant association between clinical variable like disease condition, type of needle used, size of cannula, presence of care provider during procedure and pain perception at $p<0.01$ in control group. It was inferred that there was a significant association between the presence of care provider during procedure and pain perception at $p<0.01$ in the experimental group of infants and no significant association between other clinical variable and pain perception in experimental group of infants. Hence, the null hypothesis H_{04} was partially rejected with presence of care provider during procedure in the infants in experimental group and completely retained with regards to other clinical variables in control and experimental group of infants.

Determine the level of satisfaction of nurses in experimental group of infants during IV cannulation.

The level of satisfaction of nurses regarding oral sucrose administration prior IV cannulation, is noted that, majority of the nurses (90%) were highly satisfied and only (10%) of the nurses are moderately satisfied. It indicates that the nurses were also under stress and anxious regarding the painful experience of infant during the IV cannulation or any other procedure.

Conclusion

The IV cannulation is s stressful and painful event for children, it is necessary to provide pharmacological or non pharmacological intervention to reduce the pain and discomfort in the infants. The findings of the study indicated that the administration of oral is simple, safe, cost effective to administer than any other pharmacological pain intervention. While preparing the solution we must remember about the concentration of the solution, sterile technique, amount of solution to administer, position of the infant, length of stay of solution.

Implications

The findings of the study have implications in the different branches of nursing profession i.e, nursing practice, nursing education, nursing administration and nursing research. By assessing the effectiveness of oral sucrose solution before IV cannulation, we get a clear picture regarding different steps to taken in all fields, to improve the standards of nursing profession.

Nursing practice

IV cannulation is doing in infants for various purposes like administration of IV fluids, medication administration, blood collection etc. It was identified from the study that oral sucrose solution was effective in pain management before IV cannulation. As nurses play a major role in identifying the health need of infants, they should have awareness about the simple pain management intervention, to relieve pain and discomfort of the infants during IV cannulation. All institutions and clinics should be supported and encouraged this kind of non pharmacological measures during IV cannulation.

Nursing education

With the emerging health care trends, nursing education must force on non pharmacological and pharmacological innovations to enhance the nursing care. Integration of theory and practice is a vital need and it is important in nursing education. The nursing students should be taught about the importance of various pain management strategies that could be used in infants during IV cannulation. They should also be taught the importance of pain management in infants as that of adults Nurse Educators should orient the students the various forms of pain assessment tools for infants and pain management strategies that are available.

Nursing administration

With technological advances and the ever growing challenges of health care needs, the administrators have a responsibility to provide nurses with substantive confined education opportunities. This will enable the nurses to update their knowledge on latest pain management strategies available to demonstrate high quality client care.

The nurse administrator should take initiative in organizing the continuing education programs on pharmacological and non pharmacological pain management for the nursing personnel in the hospital with modern video aids to gain adequate steps in formulating policies and protocols in pain management of infants. Nurse administrator should ensure the infants and children are getting adequate pain management for all procedure they undergo, so that quality of nursing care could be improved.

Nursing research

There is a need for extensive and intensive research in this area. It opens a big avenue for research in the innovative methods of non pharmacological management on quality and cost effectiveness so as to generate more scientific data base on which new pain management strategies could be developed. Disseminate the findings of the evidence based practice through conferences, seminars, and publishing in nursing journal, World Wide Web and promote effective utilization of research findings on pain management. Nurse researcher should challenge to perform scientific work and take part in assessment, applications, evaluation of an infant during IV cannulation.

Recommendations

- The study can be conducted on larger sample to generalize the results.
- The study can be conducted in different settings.
- The same study can be conducted for pain management during other invasive procedure like intra muscular injection, lumbar puncture etc.
- A comparative study can be conducted to evaluate the effectiveness of various other interventions to reduce pain.
- The study can be conducted among children of different age groups.
- The study could be conducted to assess the knowledge and attitude of nurses on pharmacological and non pharmacological pain management during IV cannulation
- A study can be done to compare the effectiveness of oral sucrose solution with different dosage and time duration.

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APPENDIX – I

LETTER SEEKING PERMISSION TO CONDUCT STUDY

Apollo College of Nursing
(A unit of Apollo Hospitals Educational Trust)
(Recognised by the Indian Nursing Council and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0222/13 *04.05.2013*

To

The Director
Apollo Childrens Hospital
No.15, Shafi Mohamed Road
Greams Road
Chennai – 600 006.

Respected Sir / Madam,

Sub: To request permission for research study- Reg.

Greetings! As a part of the curriculum requirement our 2nd year M. Sc. (N) student Ms. Minu Abraham has selected the following title for her research study.

"An Experimental study to assess the effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation at selected hospitals Chennai."

So I kindly request your goodselves to permit her to conduct study in your esteemed institution

Thanking You,

Dr.LATHA VENKATESAN
PRINCIPAL

Regd. Office : 21, Greams Lane Off, Greams Road, Chennai - 600 006. Ph. : +91-44-2829 3333, 2829 0200 Website : www.apollohospitalseducation.com
Unit Office : Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095. Phone : 044 - 2653 4387 Fax : 044 - 2653 4923 / 2653 4386

APPENDIX - II

LETTER PERMITTING TO CONDUCT STUDY

Apollo College of Nursing
(A unit of Apollo Hospitals Educational Trust)
(Recognised by the Indian Nursing Council and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0222/13 ***04.05.2013***

To

The Director
Apollo Childrens Hospital
No.15, Shafi Mohamed Road
Greams Road
Chennai – 600 006.

Respected Sir / Madam,

Sub: To request permission for research study- Reg.

Greetings! As a part of the curriculum requirement our 2nd year M. Sc. (N) student Ms. Minu Abraham has selected the following title for her research study.

"An Experimental study to assess the effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation at selected hospitals Chennai."

So I kindly request your goodselves to permit her to conduct study in your esteemed institution

Thanking You,

Okay Approved

Dr.LATHA VENKATESAN
PRINCIPAL

Regd. Office : 21, Greams Lane Off, Greams Road, Chennai - 600 006. Ph. : +91-44-2829 3333, 2829 0200 Website : www.apollohospitalseducation.com
Unit Office : Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095. Phone : 044 - 2653 4387 Fax : 044 - 2653 4923 / 2653 4386

APPENDIX – III

ETHICS COMMITTEE LETTER

Ethics Committee

15 May 2013

To,
Ms. Minu Abraham
2nd Year M.SC (Nursing),
Department of Pediatric Nursing,
Apollo College of Nursing, Chennai.

Ref: An experimental study to assess the effectiveness of oral sucrose solution upon pain perception among infants undergoing IV cannulation at selected hospitals, Chennai.

Sub: Approval of the above referenced project and its related documents.

Dear Ms. Minu Abraham,

Ethics Committee-Apollo Hospitals has received the following document submitted by you related to the conduct of the above-referenced study.

- Project proposal.
- Informed Consent form

The Ethics Committee-Apollo Hospitals reviewed and discussed the Project proposal documents submitted by you related to the conduct of the above referenced Project at its meeting held on 14 May 2013.
The following Ethics Committee Members were present at the meeting held on 14 May 2013:

Name	Profession	Position in the committee
Dr. Rema Menon	Clinician	Member Secretary
Dr. P. Nalini Rao	Social Worker	Chairperson
Dr. Renuka Singh	Consultant Clinical Pharmacologist	Basic Medical Scientist
Dr. Krishna Kumar	Clinician-Medical Superintendent	EC -Member
Miss. N. Suseela	Retired English Teacher	Layperson
Ms. Maimoona Badsha	Lawyer	Lawyer
Dr. Vijayakumar	Clinician	EC-Member

Apollo Hospitals Enterprise Limited
21, Greams Lane, Off Greams Road, Chennai - 600 006
Tel : 91 - 44 - 2829 1618, 2829 3333, 91 - 44 - 2829 5465 Extn : 5045 / 6641
Fax : 91 - 44 - 2829 1618 / 4449 E - Mail : ecapollochennai@gmail.com

Ethics Committee

Apollo HOSPITALS
TOUCHING LIVES

After due ethical and scientific consideration, the Ethics Committee has approved the above presentation submitted by you.

The EC review and approval of the report is only to meet the academic requirement and will not amount to any approval of the conclusions / recommendations as conclusive, deserving adoption and implementation, in any form, in any healthcare institution.

The Ethics Committee is constituted and works as per ICH-GCP, ICMR and revised Schedule Y guidelines.

With Regards,

Date:
15/5/13

Rema Menon

Dr. Rema Menon,
Ethics Committee-Member Secretary,
Apollo Hospitals, Chennai,
Tamil Nadu, India.

Dr. REMA MENON
MEMBER SECRETARY
ETHICS COMMITTEE, APOLLO HOSPITALS
APOLLO HOSPITALS ENTERPRISE LIMITED
CHENNAI-600 006, TAMILNADU

Apollo Hospitals Enterprise Limited
21, Greams Lane, Off Greams Road, Chennai - 600 006
Tel : 91 - 44 - 2829 1618, 2829 3333, 91 - 44 - 2829 5465 Extn : 5045 / 6641
Fax : 91 - 44 - 2829 1618 / 4449 E - Mail : ecapollochennai@gmail.com

APPENDIX - IV

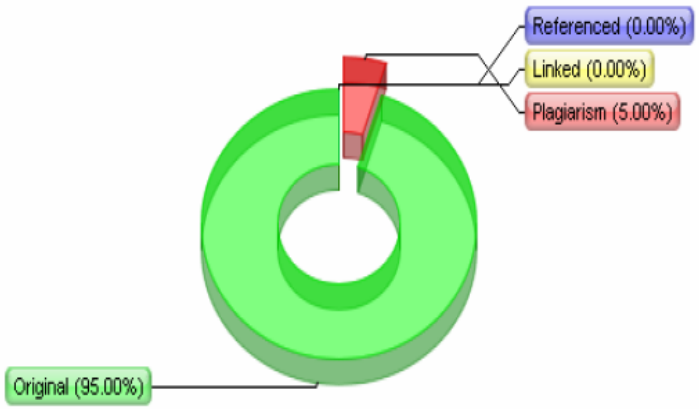
PLAGIARISM ORIGINALITY REPORT

	Plagiarism Detector - Originality Report
	Plagiarism Detector Project: [http://plagiarism-detector.com] Application core verrsion: 557

Originality report details:		
	Generation Time and Date:	1/9/2013 7:01:30 PM
	Document Name:	MINU ABRAHAM THESIS.doc
	Document Location:	C:\Documents and Settings\Administrator\Desktop\ MINU ABRAHAM THESIS.doc
	Document Words Count:	162105

Important Hint: to understand what exactly is meant by any report value - you can click "Help Image" . It will navigate you to the most detailed explanation at our web site.

Plagiarism Detection Chart:

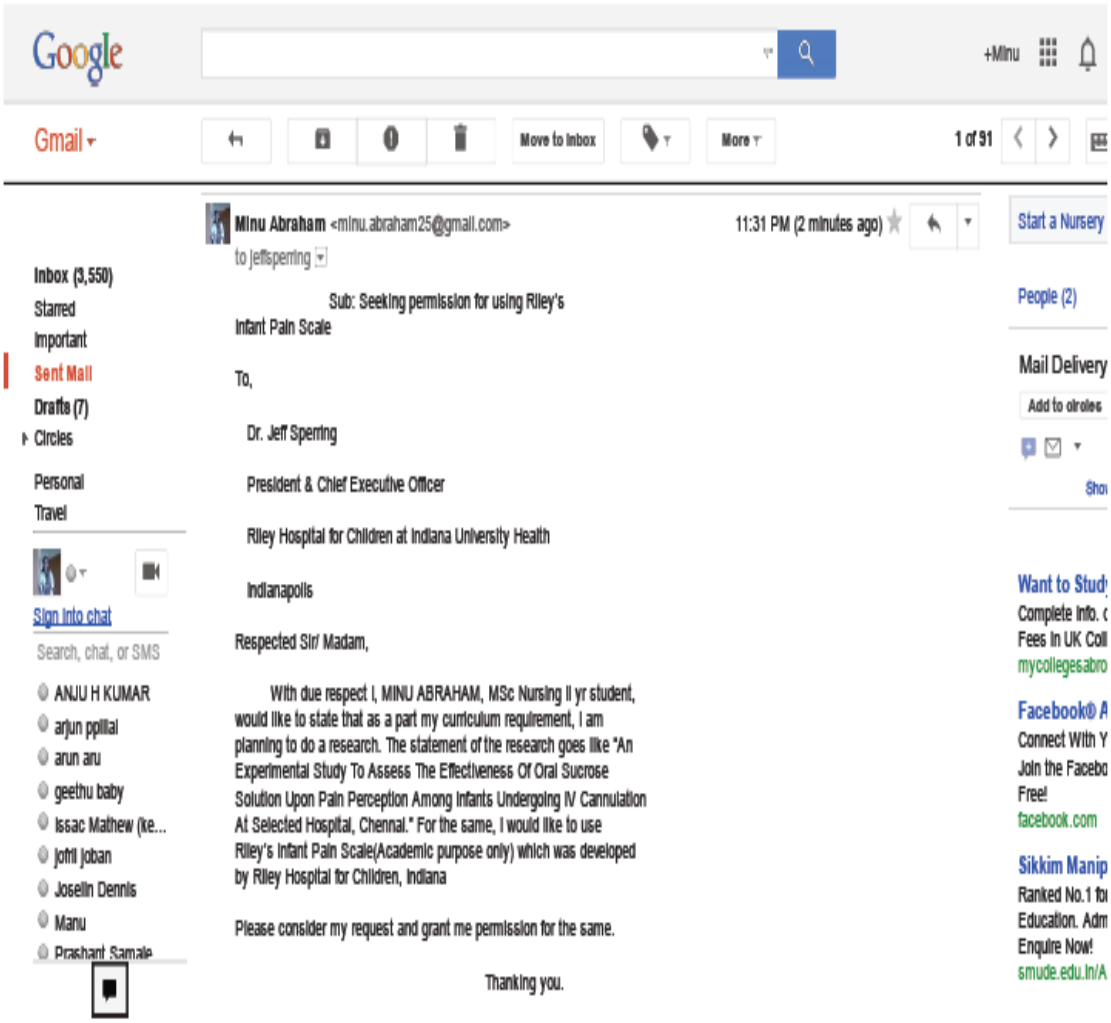


Referenced 0% / Linked 0%

Original - 95% / 5% - Plagiarism

APPENDIX – V

LETTER SEEKING PERMISSION TO USE THE TOOL



Google +Minu

Gmail Move to inbox More 1 of 91

Inbox (3,550)
Starred
Important
Sent Mail
Drafts (7)
Circles
Personal
Travel

Sign into chat
Search, chat, or SMS
ANJU H KUMAR
arjun ppillai
arun aru
geethu baby
Issac Mathew (ke...
johti joban
Joselin Dennis
Manu
Prashant Samale

Minu Abraham <minu.abraham25@gmail.com> 11:31 PM (2 minutes ago)
to jeffspering

Sub: Seeking permission for using Riley's Infant Pain Scale

To,

Dr. Jeff Sperring

President & Chief Executive Officer

Riley Hospital for Children at Indiana University Health

Indianapolis

Respected Sir/ Madam,

With due respect I, MINU ABRAHAM, MSc Nursing II yr student, would like to state that as a part my curriculum requirement, I am planning to do a research. The statement of the research goes like "An Experimental Study To Assess The Effectiveness Of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation At Selected Hospital, Chennai." For the same, I would like to use Riley's Infant Pain Scale(Academic purpose only) which was developed by Riley Hospital for Children, Indiana

Please consider my request and grant me permission for the same.

Thanking you.

Start a Nursery
People (2)
Mail Delivery
Add to circles
Want to Stud
Complete Info.
Fees In UK Coll
mycollegesabro
Facebook® A
Connect With Y
Join the Facebo
Free!
facebook.com
Sikkim Manip
Ranked No.1 fo
Education. Adm
Enquire Now!
smude.edu.in/A

APPENDIX – VI

REQUEST FOR CONTENT VALIDITY

LETTER REQUESTING OPINIONS AND SUGGESTIONS OF EXPERTS FOR ESTABLISHING CONTENT VALIDITY OF RESEARCH

From

Ms. Minu Abraham,
M.Sc., (Nursing) II Year,
Apollo College of Nursing,
Chennai-95.

To

Through Proper channel
Dr. Latha Venkatesan,
Principal,
Apollo College of Nursing.

Sub: Request for opinions and suggestions of experts for content validity of Research tool.

Respected Sir/ Madam

Greetings! As a part of the Curriculum Requirement the following research title is selected for the study.

"An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai.".

I will be highly privileged to have your valuable suggestions with regard to the establishment of Content Validity of Research tool. So, I request you to validate my Research tool and give suggestions about the tool.

Thanking You,

Yours Sincerely,

(Ms.Minu Abraham)

APPENDIX – VII

CONTENT VALIDITY CERTIFICATE

I hereby certify that I have validated the research tool and interventional programme of Ms.Minu Abraham, M.Sc (Nursing) II year student who is undertaking research study on **"An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai."**

Signature of Expert

Name and designation

APPENDIX - VIII

LIST OF EXPERTS FOR CONTENT VALIDITY

1. **Dr. Latha Venkatesan, M.Sc (N)., M.Phil (N)., Ph.D (N).,**

   Principal and Professor,
   Apollo College of Nursing,
   Chennai- 600 095

2. **Dr.G. Krishna Priya , MBBS., MRCPCH (UK)**

   Consultant Pediatrician,
   Apollo Speciality Hospital, Vanagaram
   Chennai-600 095

3. **Dr. Kalpana Bharani**, **MBBS., DCH., MRCPCH (UK)**

   Consultant Pediatrician
   Apollo Speciality Hospital, Vanagaram
   Chennai- 600 095

4. **Prof. Lizy Sonia. A, M.Sc (N)., Ph.D (N).,**

   Vice Principal and Professor,
   Apollo College of Nursing,
   Chennai-600 095

5. **Prof. K. Vijayalakshmi, M.Sc (N)., Ph.D (N).,**

   HOD, Department of Mental Health Nursing,
   Apollo College of Nursing,
   Chennai- 600 095

6. **Mrs. Nesa Sathya Satchi, M.Sc (N)., Ph.D (N).,**

   HOD, Department of Child Health Nursing,
   Apollo College of Nursing,
   Chennai- 600 095

7. **Mrs. Cecilia Mary M.Sc (N).,**

   Lecturer in Child Health Nursing,
   Apollo College of Nursing,
   Chennai-600 095

APPENDIX - IX

RESEARCH PARTICIPANT CONSENT FORM

Dear Participant,

I am a M.Sc (N)., student of Apollo College of Nursing, Chennai. As a part of my study, a research on **"An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai"** is selected to be conducted. The findings of the study will be helpful in reducing the pain of infants undergoing IV cannulation.

I hereby seek your consent and co-operation to participate your child in the study. Please be frank and honest in your responses. The information collected will be kept confidential and anonymity will be maintained.

Signature of the researcher

I……. hereby consent to participate my child in the study.

Place:

Date:

Signature of the Parent

APPENDIX - X

CERTIFICATE FOR ENGLISH EDITING

TO WHOM EVER IT MAY CONCERN

This is to certify that the dissertation **"An Experimental Study to Assess the Effectiveness of Oral Sucrose Solution Upon Pain Perception Among Infants Undergoing IV Cannulation at Selected Hospitals, Chennai"** by Ms. Minu Abraham, II year M.Sc (N) Student, Apollo College of Nursing was edited for English language appropriateness.

Signature

N.S. MURALEEDHARA KURUP
Lecturer in English
College of Applied Sciences (IHRD)
Mavelikkara, Alappuzha - 690 101

COLLEGE OF APPLIED SCIENCES (IHRD) MAVELIKKARA ALAPPUZHA PIN: 690 101

APPENDIX- XI

DEMOGRAPHIC VARIABLES PROFORMA OF INFANTS UNDERGOING IV CANNULATION

Purpose:

This proforma is used to measure the demographic variables such as age, gender ,birth weight, type of family, area of residence, family income, occupation, educational status of care taker and religion

Instructions:

Researcher will collect the information by interviewing the mother or care giver. The information collected will be kept confidential and will be used for research purpose only.

Sample Number :

Hospital Number :

1. Age in months:

1.1 1-3months ☐

1.2 4-6 months ☐

2. Gender

2.1 Male ☐

2.2 Female ☐

3. Birth weight in kilo grams of infants

3.1 < 2.5 ☐

3.2 2.5 – 3.5 ☐

3.3 <3.5 ☐

4. Type of Family

4.1 Nuclear ☐

4.2 Joint ☐

4.3 Extended ☐

5. Area of Residence

5.1 Urban ☐

5.2 Suburban ☐

5.3 Rural ☐

6. Family Income in Rupees

6.1 <10,000 ☐

6.2 10,000-30,000 ☐

6.3 <30,000 ☐

7. Occupation

7.1 Salaried ☐

7.2 Self-employed ☐

7.3 Unemployed ☐

8 .Educational status of the care taker

8.1 Non-literate ☐

8.2 Primary School ☐

8.3 Middle School ☐

8.4 Higher Secondary ☐

8.5 Graduate ☐

9. Religion

9.1 Hindu ☐

9.2 Christian ☐

9.3 Muslim ☐

9.4 Others ☐

APPENDIX - XII

CLINICAL VARIABLES PROFORMA OF INFANTS UNDERGOING IV CANNULATION

Purpose:

The proforma is used to collect the information such as disease condition of the child, details of IV cannulation, presence of care provider during the procedure.

Instruction:

The interviewer will be collecting the information through hospital records, observation of the intravenous site and by interviewing the family members and nurses.

Sample Number :

Hospital Number :

1. Disease condition of child

1.1 Cardio-vascular disorder ☐

1.2 Neurological disorder ☐

1.3 Gastro-intestinal disorder ☐

1.4 Musculo-skeletal disorder ☐

1.5 Endocrine disorder ☐

1.6 Genito-urinary disorder ☐

1.7 Others ☐

2. Type of needle used for IV cannulation

2.1 Butterfly needle ☐

2.2 Venflon ☐

3. Size of intra venous cannula or needle

3.1 20G ☐

3.2 21G ☐

3.3 22G ☐

3.4 24G ☐

3.5 26G ☐

4. Indication for IV cannulation ☐

4.1 Intravenous injection ☐

4.2 Administration of IV fluids ☐

4.3 Blood collection ☐

4.4 Administration of blood product

5. IV cannulation performed by

5.1 Nurse ☐

5.2 Physician ☐

5.3 Technician ☐

6. Area of IV cannulation

6.1 Median cubital vein ☐

6.2 Basilic vein ☐

6.3 Cephalic vein ☐

6.4 Central venous ☐

6.5 Dorsal venous network ☐

7. Previous experience of IV cannulation

7.1 Yes ☐

7.2 No ☐

8. Presence of care provider during the procedure

8.1 Yes ☐

8.2 No ☐

9. Whether the child is on analgesic

9.1 No ☐

9.2 Yes. If Yes, name of the analgesic ☐

APPENDIX-XIII

RILEY'S INFANT PAIN SCALE

Purpose:

This standardized scale is used to measure the pain perception of infants which will be scored by the researcher.

Instruction:

During IV cannulation of the infant the researcher scores the pain perceived by the infant, by marking a tick against the most preferred alternative.

Behaviour	Findings	Points
Facial	Neutral /Smiling	0
	Frowning /grimacing	1
	Clenched teeth	2
	Full cry expression	3
Body Movement	Calm, relaxed	0
	Restless/fidgeting	1
	Moderate agitation/moderate mobility	2
	Thrashing, flailing, incessant agitation or strong voluntary immobility	3
Sleep	Sleeping quietly with easy respiration	0
	Restless while asleep	1
	Sleeps intermittently	2
	Sleeping for prolonged periods of time interrupted by jerky movements or unable to sleep	3
Verbal / Vocal	No cry	0
	Whimpering ,complaining	1
	Pain Crying	2
	Screaming, high pitched cry	3
Consolability	Neutral	0
	Easy to console	1
	Not easy to console	2
	Inconsolable	3
Response to Movement/ Touch	Moves easily	0
	Winces when touched / moved	1
	Cries out when moved /touched	2
	High-pitched cry or scream when touched or moved	3

Interpretation

0	No pain
1-6	Mild pain
7-12	Moderate pain
13-18	Severe pain

BLUE PRINT ON RATING SCALE ON LEVEL OF SATISFACTION OF NURSES ON EFFECTIVENESS OF ORAL SUCROSE ADMINISTRATION DURING IV CANNULATION

SL NO	CONTENT	ITEMS	TOTAL ITEMS	PERCENTAGE
1	Characteristics of Research	1,2,3,4,5,6,7	7	58.33%
2	Characteristics of Researcher	8,9	2	16.66%
3	Effects of intervention on the baby	10,11,12	3	25%
TOTAL			**12**	**100%**

APPENDIX - XIV

RATING SCALE ON LEVEL OF SATISFACTION OF NURSES REGARDING ORAL SUCROSE SOLUTION ADMINISTRATION DURING IV CANNULATION

This tool is developed by the investigator.

Purpose

This rating scale is used to collect information on level of satisfaction of nurses on oral sucrose administration during IV cannulation.

Instruction

Respond to all the questions listed below. Select one correct response & place tick mark in the respective column. Give your responses freely & frankly. Collected information will be kept confidential & anonymity will be maintained.

S. No.	Items	3 Highly satisfied	2 Satisfied	1 Dissatisfied	0 Highly dissatisfied
1.	The bedside environment during intervention				
2.	The method of oral sucrose administration				
3.	The duration of the therapy				
4.	The timing of therapy				
5.	The general cleanliness maintained during the therapy				
6.	The instruments used for pain assessment				
7.	Method of administration				

8.	The approach of the researcher				
9.	Communication skill of the researcher				
10	Baby's coping ability to pain perception during IV cannulation				
11.	Comfort level of the baby				
12.	Child appears relaxed during procedure				

Scoring Key

Highly Satisfied – 3

Satisfied – 2

Dissatisfied – 1

Highly Dissatisfied – 0

Score Interpretation

Score	**Percentage**	**Interpretation**
<14	<40%	Low satisfaction
15-25	40-69%	Moderate satisfaction
26-36	<70%	High satisfaction

APPENDIX - XV

ITEM WISE FREQUENCY AND PERCENTAGE DISTRIBUTION OF LEVEL OF SATISFACTION OF NURSES REGARDING ORAL SUCROSE SOLUTION ADMINISTRATION DURING IV CANNULATION

Items	Highly satisfied		Satisfied		Dissatisfied		Highly dissatisfied	
	n	p	n	p	n	p	n	p
1. The bedside environment during intervention	25	83.33	5	16.66	-	-	-	-
2. The method of oral sucrose administration	23	76.66	7	23.33	-	-	-	-
3. The duration of the therapy	27	90	3	10	-	-	-	-
4. The timing of therapy	22	73.33	8	26.66	-	-	-	-
5. The general cleanliness maintained during the therapy	25	83.33	5	16.66	-	-	-	-
6. The instruments used for pain assessment	19	63.33	11	36.66	-	-	-	-
7. Method of administration	22	73.33	8	26.66	-	-	-	-
8. The approach of the researcher	24	80	6	20	-	-	-	-
9. Communication skill of the researcher	25	83.33	5	16.66	-	-	-	-
10. Baby's coping ability to pain perception during IV cannulation	20	66.66	10	33.33	-	-	-	-
11. Comfort level of the baby	21	70	9	30	-	-	-	-
12. Child appears relaxed during procedure	26	86.66	4	13.33	-	-	-	-

APPENDIX - XVI

DATA CODE SHEET

DEMOGRAPHIC VARIABLES PROFORMA

1. AGE: Age in months :

1.1 1-3months

1.2 4-6 months

2. GEN:Gender

2.1 Male

2.2 Female

3. BWT: Birth weight in kilo grams of infants

3.1 < 2.5

3.2 2.5 – 3.5

3.3 <3.5

4. TF: Type of Family

4.1 Nuclear

4.2 Joint

4.3 Extended

5. AR: Area of Residence

5.1 Urban

5.2 Suburban

5.3 Rural

6. FIR: Family Income in Rupees

6.1 <10,000

6.2 10,000-30,000

6.3 <30,000

7. OCC: Occupation

7.1 Salaried

7.2 Self-employed

7.3 Unemployed

8 .EDU: Educational status of the care taker

8.1 Non-literate

8.2 Primary School

8.3 Middle School

8.4 Higher Secondary

8.5 Graduate

9. REL: Religion

9.1 Hindu

9.2 Christian

9.3 Muslim

9.4 Others

APPENDIX - XVI

DATA CODE SHEET

CLINICAL VARIABLES PROFORMA

1. DCC:Disease condition of child

1.1 Cardio-vascular disorder

1.2 Neurological disorder

1.3 Gastro-intestinal disorder

1.4 Musculo-skeletal disorder

1.5 Endocrine disorder

1.6 Genito-urinary disorder

1.7 Others

2. TNU:Type of needle used for IV cannulation

2.1 Butterfly needle

2.2 Venflon

3. SIC:Size of intra venous canula or needle

3.1 20G

3.2 21G

3.3 22G

3.4 24G

3.5 26G

4. IIC:Indication for IV cannulation

4.1 Intravenous injection

4.2 Administration of IV fluids

4.3 Blood collection

4.4 Administration of blood product

5. PER:IV cannulation performed by

5.1 Nurse

5.2 Physician

5.3 Technician

6. AIC: Area of IV cannulation

6.1 Median cubital vein

6.2 Basilic vein

6.3 Cephalic vein

6.4 Central venous

6.5 Dorsal venous network

7. PEC:Previous experience of IV cannulation

7.1 Yes

7.2 No

8. PCP:Presence of care provider during the procedure

8.1 Yes

8.2 No

9. WCA:Whether the child is on analgesic

9.1 No

9.2 Yes. If Yes , name of the analgesic

APPENDIX XVII
MASTER CODE SHEET

CONTROL GROUP										
DEMOGRAPHIC VARABLES										PAIN PERCEPTION
SL.NO	AGE	GEN	BWT	TF	AR	FIR	OCC	EDU	REL	
1	1.1	2.1	3.2	4.1	5.3	6.1	7.2	8.3	9.1	13
2	1.2	2.2	3.2	4.1	5.1	6.3	7.1	8.5	9.1	13
3	1.2	2.2	3.2	4.1	5.1	6.3	7.1	8.5	9.3	14
4	1.2	2.1	3.2	4.2	5.2	6.2	7.2	8.5	9.1	13
5	1.2	2.1	3.2	4.1	5.1	6.3	7.1	8.4	9.1	12
6	1.1	2.1	3.2	4.1	5.2	6.3	7.1	8.5	9.1	11
7	1.2	2.1	3.2	4.1	5.2	6.2	7.1	8.5	9.1	15
8	1.2	2.1	3.2	4.1	5.2	6.2	7.1	8.5	9.1	0
9	1.2	2.2	3.2	4.2	5.3	6.1	7.3	8.2	9.3	13
10	1.2	2.1	3.2	4.1	5.2	6.2	7.1	8.4	9.1	15
11	1.2	2.2	3.3	4.1	5.1	6.3	7.1	8.5	9.2	13
12	1.2	2.1	3.2	4.1	5.2	6.2	7.1	8.5	9.4	0
13	1.2	2.2	3.2	4.1	5.2	6.3	7.1	8.5	9.3	12
14	1.2	2.2	3.2	4.1	5.2	6.2	7.2	8.5	9.1	14
15	1.2	2.1	3.1	4.1	5.1	6.3	7.1	8.5	9.2	12
16	1.2	2.2	3.2	4.1	5.2	6.2	7.1	8.5	9.1	13
17	1.2	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	13
18	1.2	2.2	3.2	4.1	5.1	6.3	7.1	8.4	9.1	14
19	1.2	2.1	3.2	4.1	5.2	6.3	7.2	8.4	9.3	14
20	1.1	2.1	3.2	4.2	5.3	6.1	7.3	8.3	9.1	11
21	1.2	2.1	3.2	4.1	5.3	6.1	7.3	8.3	9.1	12
22	1.2	2.2	3.2	4.2	5.3	6.1	7.2	8.3	9.2	6
23	1.1	2.1	3.2	4.1	5.3	6.1	7.3	8.3	9.1	6
24	1.1	2.2	3.2	4.1	5.2	6.3	7.1	8.5	9.1	13
25	1.1	2.1	3.2	4.2	5.2	6.2	7.1	8.5	9.1	12
26	1.2	2.1	3.2	4.1	5.2	6.2	7.2	8.5	9.1	13
27	1.1	2.2	3.2	4.1	5.2	6.3	7.1	8.5	9.1	13
28	1.1	2.1	3.2	4.1	5.1	6.3	7.2	8.5	9.1	13
29	1.2	2.2	3.2	4.1	5.2	6.2	7.1	8.5	9.3	6
30	1.1	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	12

EXPERIMENTAL GROUP											
DEMOGRAPHIC VARABLES										PAIN PERCEPTION	SATISFACTION
SL.NO	AGE	GEN	BWT	TF	AR	FIR	OCC	EDU	REL		
1	1.2	2.2	3.2	4.1	5.3	6.1	7.2	8.4	9.1	8	33
2	1.2	2.1	3.2	4.1	5.3	6.1	7.3	8.3	9.1	4	34
3	1.2	2.1	3.2	4.1	5.2	6.2	7.2	8.5	9.1	6	33
4	1.2	2.1	3.3	4.1	5.1	6.3	7.3	8.5	9.1	3	33
5	1.2	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	10	25
6	1.2	2.1	3.2	4.1	5.3	6.1	7.2	8.4	9.3	0	34
7	1.1	2.2	3.1	4.2	5.1	6.3	7.1	8.5	9.1	5	30
8	1.2	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	5	34
9	1.2	2.1	3.1	4.1	5.2	6.2	7.2	8.5	9.3	5	34
10	1.2	2.1	3.1	4.1	5.2	6.3	7.1	8.5	9.2	8	33
11	1.2	2.1	3.2	4.1	5.2	6.2	7.1	8.5	9.1	0	24
12	1.1	2.2	3.2	4.1	5.3	6.1	7.3	8.3	9.1	0	35
13	1.2	2.2	3.2	4.1	5.2	6.3	7.1	8.5	9.1	8	36
14	1.1	2.2	3.2	4.1	5.2	6.3	7.1	8.5	9.1	6	34
15	1.2	2.2	3.2	4.1	5.3	6.1	7.3	8.3	9.1	13	30
16	1.2	2.2	3.3	4.2	5.3	6.1	7.2	8.4	9.1	0	35
17	1.2	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	5	34
18	1.2	2.1	3.2	4.1	5.2	6.3	7.1	8.5	9.1	5	36
19	1.1	2.1	3.2	4.1	5.2	6.2	7.1	8.5	9.3	6	36
20	1.2	2.1	3.1	4.2	5.1	6.3	7.2	8.5	9.1	7	35
21	1.1	2.1	3.2	4.1	5.3	6.1	7.2	8.3	9.1	6	35
22	1.2	2.2	3.2	4.1	5.3	6.1	7.3	8.2	9.1	11	36
23	1.2	2.1	3.3	4.1	5.1	6.3	7.1	8.5	9.1	3	34
24	1.2	2.2	3.2	4.2	5.3	6.1	7.3	8.3	9.1	14	36
25	1.1	2.2	3.2	4.1	5.2	6.2	7.2	8.5	9.1	0	25
26	1.1	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.2	7	36
27	1.1	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	6	32
28	1.2	2.1	3.2	4.1	5.1	6.3	7.1	8.5	9.1	5	32
29	1.1	2.2	3.3	4.2	5.2	6.2	7.2	8.5	9.1	5	34
30	1.2	2.2	3.2	4.1	5.3	6.1	7.2	8.3	9.1	7	30

CLINICAL VARIABLES									
CONTROL GROUP									
SLNO	DCC	TNU	SIC	IIC	PER	AIC	PEC	PCP	WCA
1	1.4	2.2	3.4	4.1	5.1	6.1	7.1	8.2	9.1
2	1.7	2.1	3.4	4.3	5.1	6.2	7.2	8.1	9.1
3	1.7	2.1	3.4	4.3	5.1	6.3	7.2	8.1	9.1
4	1.7	2.2	3.5	4.1	5.1	6.1	7.1	8.2	9.1
5	1.6	2.2	3.5	4.1	5.1	6.5	7.1	8.2	9.1
6	1.7	2.1	3.4	4.3	5.1	6.1	7.2	8.1	9.1
7	1.7	2.2	3.5	4.1	5.1	6.3	7.2	8.2	9.1
8	1.7	2.2	3.5	4.1	5.1	6.1	7.1	8.2	9.1
9	1.3	2.1	3.5	4.1	5.1	6.1	7.1	8.2	9.1
10	1.6	2.2	3.4	4.3	5.1	6.2	7.1	8.1	9.1
11	1.7	2.1	3.5	4.1	5.1	6.3	7.2	8.2	9.1
12	1.2	2.1	3.4	4.3	5.1	6.3	7.1	8.2	9.1
13	1.6	2.2	3.5	4.1	5.1	6.1	7.1	8.2	9.1
14	1.2	2.2	3.4	4.2	5.1	6.5	7.1	8.2	9.1
15	1.6	2.1	3.4	4.3	5.1	6.1	7.1	8.1	9.1
16	1.6	2.2	3.5	4.1	5.1	6.5	7.2	8.2	9.1
17	1.6	2.2	3.4	4.1	5.1	6.5	7.2	8.2	9.1
18	1.3	2.2	3.5	4.2	5.1	6.5	7.1	8.2	9.1
19	1.4	2.2	3.5	4.1	5.2	6.2	7.2	8.2	9.1
20	1.7	2.2	3.5	4.2	5.1	6.5	7.1	8.2	9.1
21	1.1	2.2	3.4	4.1	5.1	6.1	7.1	8.2	9.1
22	1.1	2.2	3.5	4.2	5.1	6.3	7.2	8.2	9.1
23	1.6	2.1	3.4	4.3	5.1	6.1	7.2	8.2	9.1
24	1.6	2.2	3.4	4.1	5.1	6.2	7.2	8.2	9.1
25	1.1	2.2	3.4	4.1	5.1	6.1	7.2	8.2	9.1
26	1.7	2.1	3.4	4.3	5.1	6.1	7.2	8.2	9.1
27	1.6	2.2	3.4	4.1	5.1	6.2	7.2	8.2	9.1
28	1.1	2.1	3.4	4.1	5.1	6.3	7.2	8.2	9.1
29	1.4	2.2	3.5	4.2	5.1	6.3	7.2	8.2	9.1
30	1.3	2.1	3.4	4.3	5.1	6.1	7.2	8.2	9.1

CLINICAL VARIABLES									
EXPERIMENTAL GROUP									
SLNO	DCC	TNU	SIC	IIC	PER	AIC	PEC	PCP	WCA
1	1.1	2.2	3.5	4.1	5.1	6.1	7.1	8.2	9.1
2	1.3	2.1	3.4	4.3	5.1	6.1	7.1	8.1	9.1
3	1.7	2.2	3.4	4.2	5.1	6.3	7.1	8.2	9.1
4	1.3	2.1	3.4	4.1	5.1	6.1	7.2	8.2	9.1
5	1.6	2.2	3.4	4.1	5.1	6.5	7.1	8.2	9.1
6	1.6	2.1	3.4	4.3	5.1	6.2	7.1	8.1	9.1
7	1.7	2.2	3.5	4.1	5.1	6.1	7.2	8.2	9.1
8	1.6	2.2	3.5	4.1	5.1	6.5	7.2	8.2	9.1
9	1.1	2.2	3.5	4.2	5.2	6.5	7.1	8.2	9.1
10	1.1	2.2	3.4	4.1	5.1	6.3	7.2	8.2	9.1
11	1.7	2.1	3.4	4.3	5.1	6.2	7.2	8.1	9.1
12	1.7	2.2	3.4	4.3	5.1	6.2	7.2	8.2	9.1
13	1.6	2.2	3.5	4.2	5.1	6.3	7.2	8.2	9.1
14	1.7	2.2	3.5	4.1	5.1	6.5	7.1	8.2	9.1
15	1.1	2.2	3.4	4.2	5.1	6.3	7.2	8.2	9.1
16	1.1	2.1	3.4	4.3	5.1	6.1	7.1	8.2	9.1
17	1.3	2.2	3.5	4.1	5.1	6.2	7.2	8.2	9.1
18	1.3	2.2	3.5	4.1	5.1	6.3	7.2	8.2	9.1
19	1.7	2.2	3.5	4.1	5.1	6.5	7.2	8.2	9.1
20	1.7	2.2	3.4	4.1	5.1	6.1	7.1	8.2	9.1
21	1.1	2.2	3.4	4.1	5.1	6.4	7.2	8.2	9.1
22	1.1	2.2	3.5	4.1	5.1	6.1	7.1	8.2	9.1
23	1.7	2.1	3.4	4.3	5.1	6.1	7.2	8.1	9.1
24	1.1	2.2	3.5	4.2	5.1	6.1	7.1	8.2	9.1
25	1.2	2.2	3.4	4.2	5.1	6.2	7.1	8.2	9.1
26	1.5	2.2	3.4	4.2	5.1	6.1	7.1	8.2	9.1
27	1.1	2.1	3.4	4.3	5.1	6.2	7.1	8.2	9.1
28	1.3	2.2	3.5	4.1	5.1	6.1	7.1	8.2	9.1
29	1.6	2.2	3.5	4.2	5.1	6.5	7.1	8.2	9.1
30	1.7	2.1	3.4	4.3	5.1	6.2	7.1	8.2	9.1

APPENDIX-XIX

PHOTOGRAPHS DURING ORAL SUCROSE ADMINISTRATION AND IV CANNULATION