EFFECTIVENESS OF ORAL SUCROSE ON LEVEL OF PAIN DURING DPT IMMUNIZATION AMONG INFANTS AT SELECTED HOSPITAL SALEM

Reg.No : 301617754

THIRUMURUGAN.A

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CERTIFICATE

Certified that this is the bonafide work of **THIRUMURUGAN.A,** Swami Vivekananda College of Nursing Dharmapuri. Submitted in partial fulfillment of the requirement for the Degree of Master of Science in Nursing to The Tamilnadu Dr. M.G.R. Medical University, Chennai. Under the Registration No: 301617754

College Seal :

Signature

Mrs. P. NEELA, M.Sc (N), M.A,
Principal,
Head of the Department – Medical Surgical Nursing,
Swami Vivekananda College of Nursing,
Sri Ramakrishna Nagar, A. Jettihalli,
Dharmapuri – 636 807.

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Approved by the Dissertation committee on:

Signature of Research Guide: …….....

Mrs. Thangamani M M.Sc., (Nursing)
Professor and HOD of Child Health Nursing Department
Swami Vivekananda College of Nursing
A.Jettihalli, Dharmapuri – 636 807.

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Signature of the Internal Examiner with date

Signature of the External Examiner with date

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ABSTRACT

Pain is an unpleasant experience to all Individuals. Infants are more sensitive to pain than older children and Adults because of their still developing brain. The pediatric pain experience involves the interaction of physiologic, psychological, behavioral and situvational factors. Non-pharmalogical interventions in the management of pain have been found to the highly effective for some children and for some procedures. A study was conducted to evaluate the effectiveness of oral sucrose on level of pain during DPT immunization among infants through Quantitative of evaluative approach quasi experimental post test only control group design was used. Thirty infants who met the inclusion criteria were selected my using non-probability convenient sampling technique from selected hospital in Salem. The mean level of pain for control group it was 11.6 $\pm$ 1.17. The difference in mean Percentage was 24 indicating decreased level of pain in the experimental group. The calculated‘t’ value13.33 which was greater than the table Value at 0.01 level indicating that the difference in mean was these difference.

Key words: **Evaluation, Effectiveness, Oral Source, Pain, Infants.**

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CHAPTER I

INTRODUCTION

"Through serving the best interest of children, we serve

The best interest of all humanity"

- Carol Bellamy

Pain is an unpleasure experience to all individual. Every individual experiencing pain needs care. Infants are more sensitive to pain than older children and adults because of their still-developing brains. This is the reason that most of the children seek medical care.

Acute pain is one of the most common adverse effect experienced by children occurring as a result of injury or illness and they need necessary medical procedures. The pediatric pain experience involves the interaction of physiologic, psychologic, behavioral, and situational factors. The literature describes how to evaluate and treat acute pain in children using low-cost, widely available, convenient and safe methods.

Eventhough there are best-practice guidelines and standards related to pain management, many hospitalized children have unrelieved pain. So it is very important to assess the pain in order to identify and manage it effectively.

At one time it was believed that newborns did not feel pain. The fact that newborn brains demonstrate less differentiated responses to stimuli, and their nerves are not fully myelinated was used to substantiate this belief.

Non pharmacologic interventions in the management of pain have been found to be highly effective for some children and for some procedures. These techniques are easy to learn and should be used when possible to give the child some control in the management of pain. The examples given are distraction, muscle relaxation, and guided imagery which are easy techniques to learn and can be used with young children **(Stevens, B. et. al., 2007).**

Now a days more concern is given to the painful medical procedures that infants must undergo, the potential risks of alleviating infant pain with conventional pharmacologic agents. Studies have shown that sucrose with or without non-nutritive sucking (NNS) have analgesic effect on procedural pain in infants. (**Mc Caffery, M. and Pasora, C., 2000).**

Health care professionals should state that painful experiences and monitor the condition of children accordingly. The infant pain is ongoing assessment of the presence and severity of pain and the child's response to treatment is essential. Reliable and valid pain assessment tools are available for neonates. In a hospital setting we should concentrate on pain treatment, including adverse effects, should be monitored routinely and documented clearly and to facilitate treatment and communication among health care professionals **(Evelyn, C. et. al., 2003).**

Treatment of infants will improve when the pain management education improves and the issue of pediatric pain is brought into greater public awareness. Education of parents and others in the community who deal with children in pain is an important pediatric issue **(Luca, A. Rameghi, 2002).**

Need for the Study

Pain in early infancy has only recently been recognized as an area requiring systematic study in nursing. This has emerged as a part because of recognition of the need for an empathetic base for paediatric pain management Research has shown that past beliefs about infants perceptions of pain were incorrect. Infants do feel and remember pain **(Gary, A. Walco. et.al., 2001).**

Neonates are soft and tender they require physical and psychological support, which can be provided by nursing personnel apart from mothers who are in direct

contact with infants. Each infant has an individual pattern of capability and reactivity to painful procedures (**Evelyn, C. et. al., 2003).**

In a survey conducted on nationally representative samples of 1600 parents, 25% expressed concern over the number of immunization injections that their child is receiving. The study found that when a child received multiple injections at a single visit, the primary concern of parents was pain **(Woodin, et.al., 2006).**

Intramuscular site is more often associated with pain during injection compared to intravenous or subcutaneous. The tetanus vaccine is often singled out as a particularly painful shot due to the nature of the tetanus bacteria itself that amounts to the pain experience. DPT vaccination causes severe crying and unsettled behavior in infants **(Bucherm, et.al., 2001).**

Children are not treated for the pain caused by procedures. There is a major gap between the pain experience by children and the treatment provided **(Rogers, T. 2004).**

Barriers of pain treatment in children include the following: 1) the myth that children, especially infants, do not feel pain as adults do, or if they do, there is no untoward consequence; 2) lack of assessment and reassessment for the presence of pain in infants 3) misunderstanding of how to quantify the subjective experience of pain 4) lack of knowledge about pain treatment; 5) the perception that addressing pain in children takes too much time and effort **(Jorgenson, K., 2000).**

One of the consequences of untreated pain is that children of all ages become sensitized to pain .This is because pain may activate the physical, biochemical and cellular processes that change the future response to pain. The painful experience may cause physical and psychological changes in infants **(Schechtes, N.L. et. al., 2007).**

Painful experience may causes excitotoxic damage to the developing neurons. Untreated pain can contribute to significant increase in the morbidity of infants and lead to stressful situation **(Gibbons, S. et. al., 2000).**

Most acute pain experience in infants in medical setting can be prevented or substantially relieved. Prevention of pain whenever possible is the best approach on pain management in infants (**Ryan. et. al., 2007).**

The long term effect of brief pain, as from needles used in immunization, can be helped using local anesthetic creams or distraction in a way to reduce pain and anxiety **(Richard and Rogers, T., 2004).**

Pain management and diverting pain perception is a challenge that every nurse faces, regard less of the practice setting. It is important to anticipate the painful experience while the child is hospitalized or receiving medical treatment **(Ryan. et. al., 2007).**

A study was conducted at Mahidol University a number of non-pharmacological pain management interventions have been used to reduce pain from heel stick in preterm and full term neonates. These include swaddling, positioning, holding, rocking nonnutritive sucking, breast milk or breast feeding and oral sucrose. For example, Fearon and others found that infants 31 weeks post conceptional age or older exhibited protracted behavioral disturbance after blood was drawn by heel stick. However, this disturbance was significantly reduced by the use of swaddling. Corff and her colleagues found that preterm neonates who were arranged in a side-lying or supine position with flexed arms and legs close to the infant's trunk demonstrated that lower mean heart rate, a shorter mean crying time, a shorter mean sleep disruption time, and lesser sleep-state changes after the heel stick compared to controls whose position was not modified. Holding, and rocking and pacifiers were found to be

effective methods of reducing pain-elicited distress. Campos examined the effects of two comfort interventions, maternal holding and rocking (in a rocking chair) and pacifiers, compared with routine care administered to reduce stress of pain from heel stick among neonates. Even though pacifiers had the strongest and most consistent comforting effects, maternal holding and rocking also proved to be effective non-pharmacological interventions for reducing crying and lowering heart rate levels (**Taddio Anna, 2007).**

In recent years significant advances have been made in the field of pain management. Effective pain management is not only reducing the child's discomfort but also improves the quality of life. American Pain Societies have developed policy statements addressing the numerous therapeutic measures to minimize the pain. The administration of oral sucrose is one of the most effective interventions for reducing procedural pain in infants **(Stevens, B. et. al., 2007).**

Research was conducted to determine the effect of oral sucrose as an analgesic agent among infant during injection. Result of this investigation emphasized on oral sucrose administration prior to injection produce significantly less crying than oral sterile water solution. Early nominated experiences with painful injections, may lead to anxiety and fear in them. These reactions need not develop if steps are taken to reduce pain by health care providers. A number of studies have demonstrated that sucrose to be an efficacious analgesic for reducing the procedural pain in neonates **(Blass, 2009).**

Even though, there are many modalities to reduce pain, the use of oral sucrose for treatment of brief, mild procedural pain has been described for over ten years. The administration of oral sucrose is effective, easily absorbable, safe, and also inexpensive **(Simons, et. al., 2003).**

A study on the analgesic effect of four solutions administered intra orally (25% and 50% sucrose solutions, hydrogenated glucose and a sterile water placebo) were tested in groups of babies receiving routine DPT and HIB injections. The duration of the baby's cry during 3 minutes followings DPT and HIB injections was measured as main outcome. From all the immunization groups, babies receiving the placebo generally cried more vigorously. Oral administration of 50% sucrose solution compared to others appeared to reduce the cry response to painful experience in babies beyond neonatal period more effectively **(Luca A. Ramenghi, 2002).**

A study showed that the administration of 2 ml of 24% oral sucrose solution, 2 minutes before routine immunization is effective in decreasing maximum immunization pain in infants. The heightened behavioural pain responses observed in infants receiving sterile water reflect greater pain intensity compared with infants who received sucrose **(Linda A. Halfied et. al., 2008).**

The frequent painful procedures were performed in babies in the pediatric unit represents a greater challenge for nurses to focus on providing a "pain free" environment during diagnostic and therapeutic procedures. Offering an infant with oral sucrose instillation is an effective therapy prior to all sorts of painful procedure, especially, procedure such as DPT immunization **(Carbajal. R, et.al., 2002).**

The pediatric nurses are responsible for eliminating pain and sufferings in children whenever possible and they should advocate for the appropriate treatment of pain in children. To accomplish this, the nurses, need to expand their knowledge, use appropriate assessment tools and techniques, anticipate painful experiences and intervene accordingly. Hence, the researcher was interested to examine the effectiveness of oral sucrose to reduce the pain among infants and promote comfort **(Celeste Johuston, C.C., et, al., 2003).**

Statement of the Problem

A Study to Assess the Effectiveness of Oral Sucrose on Level of Pain during DPT Immunization among Infants at a Sri Gokulam Hospital, in Salem.

Objectives

- To assess the level of pain during DPT immunization among infants in experimental and control group
- To determine the effectiveness of oral sucrose on level of pain during DPT immunization among infants in experimental and control group.
- To associate the level of pain during DPT immunization among infants in experimental and control group with their selected demographic variables.

Operational Definitions

Effectiveness

Effectiveness refers to the reduced level of pain among infants in experimental group when compared to control group as measured by modified REILY infant pain Assessment Scale.

Oral sucrose

Oral sucrose refers to 24% sucrose solution (2ml) given to infants prior to administration of DPT immunization.

DPT Immunization

It is a vaccine administered intra muscularly in vastus lateralis to prevent Diphtheria, Pertussis and Tetanus.

Pain

Pain refers to an unpleasant experience observed in the infant during injection as measured by using modified REILY infant pain assessment scale (facial expression, body movement, activity, cry, consolability).

Infants

Infants refer to the babies of 6 - 12 weeks of age receiving DPT immunization.

Hypotheses

H_1: There will be significant difference in level of pain among infants in experimental and control group after oral sucrose administration during DPT immunization at $P < 0.05$ level.

H_2: There will be significant association between the level of pain during DPT immunization among infants in experimental and control group with their selected demographic variables at $p<0.05$ level.

Delimitations

- The study was limited to the infants receiving DPT immunization.
- The study period was limited to only 4 weeks
- The sample size was limited to 60 samples.

Projected Outcome

This study was conducted to determine the effectiveness of oral sucrose on level of pain during DPT immunization among infants. Findings of the study will enable to administer oral sucrose in the way of pain management.

Conceptual Framework

The researcher adopts modified Imogene King's goal attainment theory (1981) based on the personal & interpersonal systems including interaction, perception, judgement, communication and transaction.

The investigator adopted goal attainment as a basic theory for conceptual framework, which is aimed to effectiveness of oral sucrose in reducing pain during DPT immunization. This involves interaction between the researcher and the infants.

Five Major Concepts Describe these Phenomena

Perception

It refers to people's representation of reality. Here the researcher perceived need of oral sucrose and infants with DPT immunization.

Judgement

Judgement is decision which is made. Here the researcher decides to provide oral sucrose prior to DPT immunization to infants participating in the research study.

Action

This refers to the changes that have to be achieved. The researcher action is to provide oral sucrose prior to DPT immunization and the infants is to receive the oral sucrose solution.

Reaction

Reaction helps in setting a mutual goal. In this study the researcher and infants set a mutual goal. Here the mutual goal is reduction in level of pain.

Transaction

This is the achievement of a goal. Here the researchers goal is achievement of the reduction of pain during DPT immunization and evaluate the effectiveness of oral sucrose by using modified by REILY infants pain assessment scale.

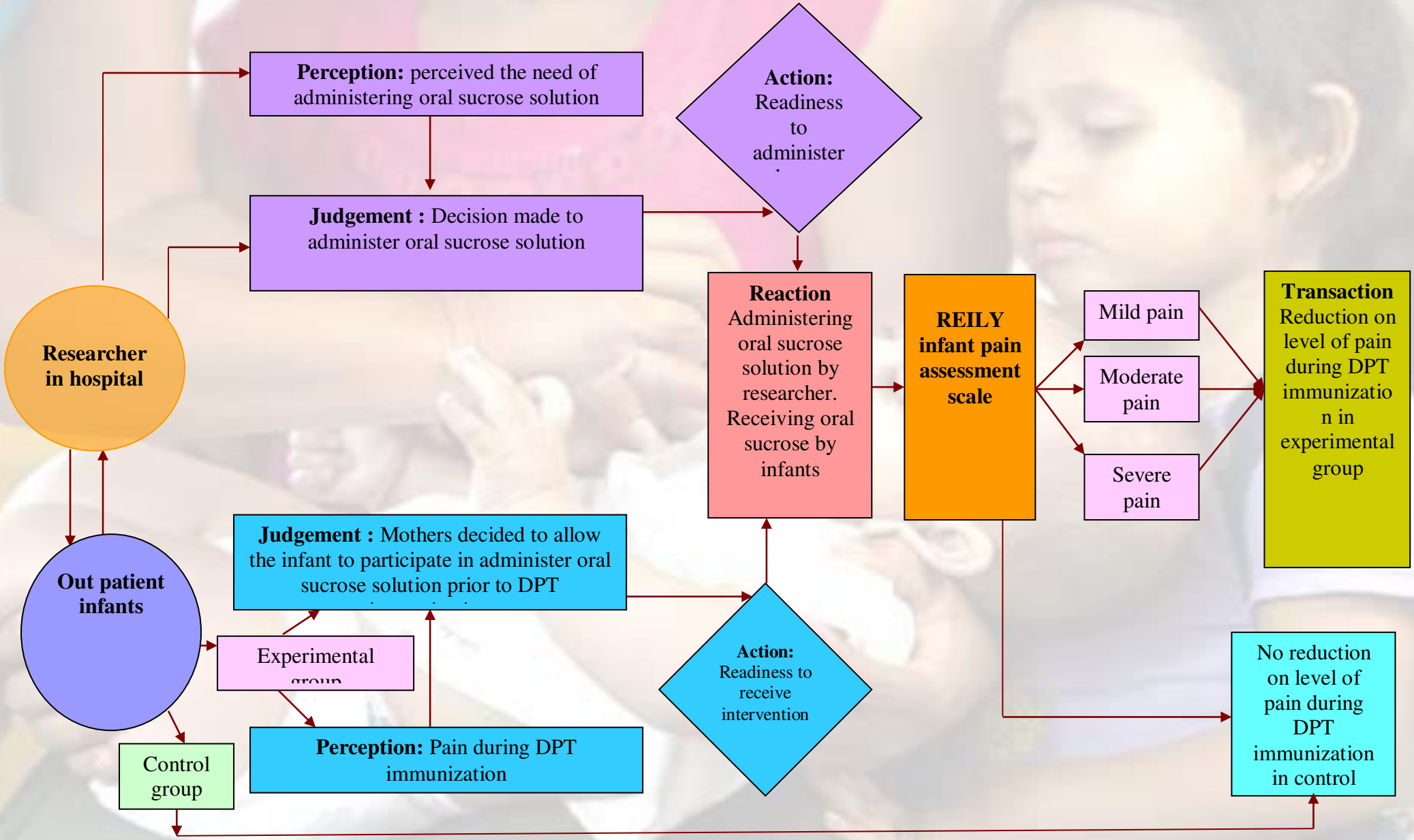

Fig.1.1- MODIFIED CONCEPTUAL FRAME WORK BASED ON IMOGENE KINGS GOAL ATTAINMENT THEORY (1981)

Summary

This chapter dealt with introduction, need for study, statement of problem, objectives, operational definitions, assumptions, hypothesis, delimitations, projected out come and conceptual framework.

CHAPTER – II

REVIEW OF LITERATURE

Literature review begins with locating as many relevant materials as possible and end with writing a summary of the available knowledge

(Judith, 1980)

Literature review of the present study is organized under the following headings

- Pain in Infants
- Non Pharmacological Intervention for Pain Relief in Infants.
- Sucrose as Analgesic to Reduce Pain in Infants.
- Assessment scales for pain
- Role of nurse in the reduction of pain

Pain in Infants

Potter and Perry (2006) reported that pain is a complex phenomenon and it is elicited by threatened or actual tissue damage that stimulates nociceptive (pain-sensitive) neural receptors. Pain also may be caused by damage to the pain transmission system itself.

Pain is a process made up of the transduction, transmission and modulation of pain. Examining each parts of the process helps the nurse to have a better understanding about the pain experience and helps to treat the client in a better way.

Theories of pain

Stevens and Johnston cite numerous theories of pain including specificity, intensity, pattern-peripheral, central summation and sensory- interaction and affect.

The gate control theory was developed to explain some common pain experiences and why certain non pharmacological interventions (eg. Massage, Trans electrical nerve stimulation) are effective in the treatment of pain.

According to gate control therapy, the dorsal horn of the spinal cord is an extremely important site for pain modulation. The theory hypothesizes that, in the dorsal horn of the spinal cord, a balance exist between large – diameter non-pain fibers and small-diameter pain fibers that synapse on central transmission cells. Stimulation of pain transmission (ie the gate is open) whereas, stimulation of large-diameter non pain fibers inhibits transmission cell activity and closes the gate. Higher cortical within the CNS can influence the gate control system by delivering descending inhibitory message to the dorsal horn of the spinal cord.

Ernst Dennis, J., (2007) conducted a longitudinal study of infant's emotional expressions to a painful medical procedure was conducted. The type and duration of emotional expressions of 2 to 7 months old infants (N=25) in response to the acute pain of diphtheria–pertusis-tetanus (DPT) inoculations predicted their emotion expressions to the same event at 19 months of age. Results may confirmed those of a previous cross- sectional study showing that particular expressions to painful stimulation occurred with regularity and that the durations of these expressions changed differentially with age.

Jonathan, et.al., (2007) conducted a study on infant pain response to intramuscular injection in France shows that infants cry less when they receive immunization shots quickly than if the shots are administered slowly.

Taddio A., et.al., (2007) conducted a study to compare the acute pain response during immunization infants, using a slow standard of care injection technique versus a rapid pragmatic technique in France. Healthy infants four to six months of age were included for the study. The rapid pragmatic technique is one where the needle is inserted and no aspiration is done, but drawn out soon after the medicine is injected. The slow standard technique is the routine method of injection

for infants. The results revealed that immunization using a rapid pragmatic technique is less painful than slow standard of care technique.

Pilara. T., et.al., (2007) conducted a study to determine the factors associated with infant pain response following an immunization injection. Infants of four to six months age group were included for the study in London. The finding suggests that parental behavior in the treatment room has a key role in influencing how infants respond to painful procedure.

Fitzgerald, (2004) reported that neonates or infants cannot verbally react to pain, but they respond to pain with increased sensitivity at birth with whole body movement. Endogenous pain inhibition develops after birth when huge fibres become myelinated.

Mercer K, and Glann. S, (2004) conducted a study to explore how infants express pain, on receiving their routine immunization at 4-6 months of developmental age in Canada. The results reveal that the pain expression was far the most common of all facial expressions following immunization.

Johnston, C.C., (2004) conducted a study to examine the behavioural responses of infants to pain stimuli across different developmental ages in Germany. 80 infants were included in this cross sectional design. Four sub samples of twenty infants each included (i) premature infants between 32 and 34 weeks gestational age undergoing heel-stick procedure (ii) full term infants receiving intramuscular vitamin k injection (iii) two months old infants receiving subcutaneous injection for immunization against DPT and (iv) four months old infants receiving subcutaneous injection for immunization against DPT. The study results imply that the premature infants have the basis for communicating pain via facial actions that are not well developed. The full term newborns express distress through specific facial actions.

Two and four month's old infants showed similar facial expression to immunization pain.

Celeste Johnson, C.C., et.al., (2003) reported that some infants may cry loudly following the procedure where as others are easily calmed by a gentle hug in United Kingdom. It is important to recognize and report such early signs of individuality and to realize that infants who were intensely less pain may still be experiencing significant discomfort after the procedure.

Strada M.E., et. al., (2002) conducted a study on fourteen infants' acute pain response during routine immunization using a multidimensional perspective. The measures used were heart rate, crying, body movements/ posturing and voice spectrographs. The pain response pattern was initially a drop in heart rate, a long, high pitched cry, followed by apnea and a facial expression of pain. This was followed by a sharp increase in the heart rate, lower pitched cry, less body rigidity and still facial expression was of pain. The results of the study suggested that facial expression may be the most consistent, across indicator of pain.

Lewindone, P.J., (2000) conducted a study to know the intensity and duration of infant pain during immunization, by combining behavioral observations of vocalization, facial expression, autonomic responses (heart rate) and body movements and found that they were characteristically changed due to pain.

Non Pharmacological Intervention for Pain Relief in Infants

Anand K.J.S. et.al., (2007) reported that a number of non pharmacological therapies have been investigated including non nutritive sucking with and without sucrose use, swaddling or facilitated tucking, kangaroo care, music therapy and multi sensorial stimulation, in the management of pain in neonates. Acupuncture may provide an effective non pharmacological approach for the treatment of pain in

neonates, even moderate of severe pain and should be considered for inclusion in a graduated multi disciplinary algorithm for neonatal pain management.

Hyesang Im, (2007) conducted a study to test the effect of Yakson therapy (a traditional Korean touching method) and non nutritive sucking on reducing pain in the neonates experience when undergoing the heel stick. Findings indicate that the oxygen saturation level is maintained significantly with the Yakson therapy and can be used during heel stick procedure in the infants.

Taddio A. et. al., (2007) conducted a study and discussed that sensory cognitive, cognitive and cognitive – behavioural type of pain and developmental level also contributed to reduce pain without drugs.

Blas, et, al., (2004) reported that the analgesic effect of concentrated sucrose and glucose and pacifiers are clinically apparent in newborns, pacifiers being more effective than sweet solutions. The association of sucrose with pacifier showed a trend towards lower scores compared with pacifier alone.

Simons, et.al., (2003) conducted a study to evaluate all painful procedures for infants, over a fourteen day period. The analysis revealed that non pharmacological comfort measures were not routinely used for painful procedures. They concluded that fewer than 35% of newborns receive analgesic therapy.

Cohenn, et.al., (2002) conducted a study on infants procedural distress. Ninety infants and their parents were randomly assigned to a distraction condition (ie, nurses used stimuli to divert infant's attention) or a typical care condition. Results indicate that infants engaged in distraction and that distraction reduced their behavioural distress.

Judith, A., (2001) conducted a study to investigate whether breast feeding is effective for pain relief during venipuncture in term neonates. And compare any effect

with that oral glucose combined with a pacifier. Results show that breast feeding effectively reduces response to pain during minor invasive procedure in term neonates.

Gibbsons, S. et.al., (2000) conducted a study on heel stick procedural pain response in infants. Results demonstrated significant differences in pain responses when comparing non nutritive sucking alone, sucrose along or sterile water with non nutritive sucking in preterm and term infants. Non nutritive sucking in known to facilitate behavioural state control in infants during and following heel stick procedures.

Sucrose as Analgesic to Reduce Pain in Infants

Laurie, B. et. al., (2008) conducted a study on infants of 2-4 months of age by administering oral sucrose as an analgesic during routine immunization. The results revealed that sucrose is an effective, easy to administer and short acting analgesic.

Ernst Dennis, J. (2007) conducted a study on the analgesic effect of pacifier, oral solution and breast feeding in infants. The study conclusively determined that glucose, sucrose and dextrose solution administered before or during heel sticks and venipunctures significantly reduce pain in term and preterm infants.

Margit Thyr, (2007) conducted a study to assess the oral glucose as an analgesic to reduce infant distress following immunization at the age of three, five and twelve months. The results revealed that the administration of glucose reduced the mean crying time by 22% at three months, 62% at five months and 52% at twelve months. The research concludes that sweet solution can be used as a simple and safe method to reduce distress following immunization in infants up to twelve months.

Anand K.J.S. (2007) reported that oral sucrose solution administered via a pacifier is recommended for a number of common neonatal procedures, including heel

lancing, catheter insertion, cut down procedures, central line placements, umbilical catheter insertion, and circumcision. Analgesia for routine neonatal intensive care at NICU and procedures should include the use of swaddling and containment, non nutritive sucking and oral sucrose for painful procedures.

Maria Graddin, et.al., (2005) conducted a study to find out the effect of opiod antagonist in reducing the effect or glucose solution given orally before blood sampling in infants. The results showed that the paid reducing effect of glucose administered orally before heel stick for newborn was not diminished by previous intravenous injection of the opiod antagonist naloxone hydrochloride.

Taksande, (2005) emphasized that sucrose solution seems to reduce crying and physiological effects of a painful procedure in healthy neonates.

Blass, et. al., (2004) conducted a study and demonstrated that sucrose can safely and effectively provide analgesia for young infants receiving heel lancing. Crying of infant ingested sucrose returned to base line within 30 to 60 seconds after blood collection and control infants required 2.5 to 3 minutes to return to baseline.

Koren Gideon, (2004) conducted a randomized control trial study was conducted on infants receiving DPT intramuscular injection to assess the pain response after administering 2 ml of 75% sucrose solution by month. The results imply that the administration of the sucrose reduces the infant crying time and distress.

Evelyn.C., et.al., (2003) conducted a study on effective pain reduction in multiple immunization injection in young infants concluded that combining sucrose, oral tactile stimulation and parental holding was associated with significantly reduced cry in infants receiving multiple immunization injections.

Erickson Matt, (2002) conducted a study on the effectiveness of sucrose reducing symptoms associated with pain from venipuncture in newborns in comparison with the effect of local anesthetic cream EMLA (eutectic mixture of local anesthetics). The findings indicate that sucrose is effective in reducing the symptoms of pain and seems to be better than the local anesthetic EMLA cream.

Gillian Griffiths, (2002) conducted a study to evaluate the effects of different sucrose concentrations on measures of neonatal pain, by a randomized trial with 12.5%, 25% and 50%. The study results concluded that 25% sucrose is statistically significant in reducing neonatal heel prick pain.

Anseloni, et.al., (2001) reported that the age dependency of oral sucrose analgesia may be the result of developmental changes in the interaction between gustatory and pain pathways.

Portar, (2000) reported that sucrose solution instilled directly in to the mouth or administered on a pacifier reduces the evidence of distress reliably in children below six months of age.

Assessment scales for pain

Moshe, Ipp. (2009) conducted a study in which he used Evendol behavioural scale to objectively assess the level of pain felt by children under 7 in paediatric emergency departments. It was excellent validity criteria and easy to use, it also differentiates pain and anxiety. It is a very useful tool when the children having pain in emergency departments.

Anand K.J.S., (2007) conducted a study to assess the reliability of the ABC scale in preterm babies was the aim of the present study. The scale consists of three cry parameters which include pitch of the first cry, rhythmicity of the bout of crying and cry constancy. Changes in these parameters were previously found to differentiate

the medium and high levels of pain as evaluated by spectral analysis of crying. 72 preterm babies were selected to validate a scale, namely the study of the concurrent validity, specificity and sensibility. Besides that the interjudge reliability, the clinical utility and ease of the scale were assessed. There was correlation ($r = 0.68$; $r(2)= 0.45$; $p < 0.0001$) between scores obtained with the ABC scale and the premature infant pain profile (PIPP) scale, which demonstrate a good concurrent validity. The scale also showed sensitivity and specificity. Reliability for the interobserver method was good: Cohen's kappa = 0.7. The correlation between the two scales shows that the ABC scale is also reliable for premature babies.

George, (2003) reported that in the last 20 years only have standard clinical assessment tools that validate infant pain exist. The NIPS pain scale is a common standard for infants under 1 year old, and the REILY pain scale is recommended for children 2-7 years old, but is frequently used for infants as well. This tool consist of facial expression, body movement, cry, activity, consolability.

Fran L.P., (2002) conducted a study to monitor electrical changes in skin during acute pain in pediatric patients. The major aim of this study was to test the method in pediatric patients. A total of 180 postoperative pediatric patients aged 1-16 yrs were included in this prospective, blinded observational study. After arrival in the recovery unit, pain was assessed by standard clinical pain assessment tools (1-3 yrs: Face Legs Activity Cry Consolability Scale, 4-7 yrs: Revised Faces Scale, 8-16 yrs: Visual Analogue Scale) at various time points during their stay in the recovery room. The total number of fluctuations in skin conductance per second (NFSC) was recorded at the same time. Total 165 children were used for statistical analysis, and 15 patients were excluded. The area under the Receiver Operating Characteristic curve for predicting moderate to severe pain from NFSC was 0.82 (95% confidence interval

0.79-0.85). Over an all age groups, NFSC cutoff value of 0.13 was found to differentiate between no or mild versus moderate or severe pain with a sensitivity of 90% and a specificity of 64% (positive predictive value 35%, negative predictive value 97%). NFSC accurately had foreseen the absence of moderate to severe pain in postoperative pediatric patients. The measurement of NFSC may therefore provide an additional tool for pain assessment in this group of patients.

Ericson Matt et. al., (2002) conducted a study among neonates admitted in the neonatal intensive care unit (NICU) who are subjected to many invasive painful procedures. Assessment of pain in preterm and term neonates was done with or without ventilation on continuous positive airway pressure using the Bernese Pain-Scale for Neonates (BPSN). The validity and reliability of the BPSN were established. Pain assessments (n=288) were performed by 6 health care workers in both term and preterm neonates. Each neonate (n=12) was observed in four given situations such as after feeding, while a foot was being warmed, while a routine capillary blood sample was taken and 15 min after the blood sample was taken. Pain assessments were made by using the BPSN, the Visual-Analogue Scale (VAS) and the Premature Infant Pain Profile (PIPP) by 2 nurses. At the same time, a video sequence was made and it was shown later to four nurses to assess pain using the BPSN, the PIPP, and the VAS. The construct validity was very good for the BPSN ($F=41.3$, $p<0.0001$). The concurrent and convergent validity of the BPSN was compared to VAS and PIPP was $r=0.86$, and $r=0.91$, $p<0.0001$, respectively. Finally, the study showed high coefficients for inter-rater (r=0.86-0.97) and intra-rater reliability (r=0.98-0.99). They concluded that BPSN was a valid and reliable tool for assessing pain in term and preterm neonates with and without ventilation.

Role of Nurse in the Reduction of Pain

McCaffery, M. and Pasero, C., (2009) reported that one of the essential parts of the nurses' caring role is relieving pain. But, pediatric nurses often failed to adequately relieve children's pain. The causes include failing to recognize pain, failing to optimize pain treatments, and accepting severe pain as an expected part of illness and treatment. Experts currently estimate that 90% of pain can be relieved by proper pain management measures.

Evelyn. C., et. al., (2007) reported that pain management knowledge deficiencies were identified even though the results indicate that pediatric nurses are aware that their patients experience pain. The problem may be that they do not have the knowledge required to adequately care for children in pain. Based upon these results, pediatric nurses need more information about: pain assessment; pharmacologic management including opioids, non-opioids, and adjuvant medications; risks of addiction; and the treatment of painful procedures and after surgery, and patients with cancer.

Anseloni, et. al., (2001) reported that one of the great challenges for nurses include the assessment and management of children's pain. The amount of information available to pediatric nurses about pain management has noticeably increased in the past 20 years. The Agency for Health Care Policy and Research, World Health Organization and American Pain Society have recognized clinical practice guidelines for pain assessment and pain management. In spite of all the information currently available to pediatric nurses, pain has continued to be an accepted side-effect of pediatric illnesses and treatments.

Lewinden P.J., (2000) reported that there are no instruments to quickly survey large multi-specialty pediatric nursing staff's knowledge and attitudes

regarding pain. Later, the PNKAS was developed as a modification of McCaffery and Ferrell's (1997) Nurses Knowledge and Attitudes Survey Regarding Pain (NKAS). The language of the NKAS was altered to reflect pediatric pain management standards where they differed from adult practice standards. The modifications fit into four categories: (a) modification of medication dosages, (b) removal of meperidine and aspirin, (c) addition of procedural pain management items, and (d) identification of patients as infant, child, and/or adolescent.

Summary

This chapter dealt with literature related to Pain in Infants, Non Pharmacological Intervention for Pain Relief in Infants, Sucrose as Analgesic to Reduce Pain in Infants, Assessment scales for pain and Role of nurse in the reduction of pain.

CHAPTER – III

METHODOLOGY

The methodology of research indicates the general pattern of organizing the procedure for the gathering valid and reliable data for the purpose of investigation

(**Kothari, 1996**)

This chapter consists of research approach, research design, population, description of the setting, sampling, variables, description of the tool, validity & reliability, Pilot study, method of data collection, and plan for data analysis.

The present study aims to evaluate the effectiveness of oral sucrose solution on level of pain during DPT immunization among infants at a selected hospital, Salem.

Research Approach

Quantitative evaluative research approach was adopted for the study.

Research Design

Quasi experimental involves the manipulation of an independent variable. Quasi experiments lack either the randomization or control group feature that characterizes true experiments **(Polit D.F., and Hungler, 2003).**

Quasi experimental design, in which post – test only control group design was used in this study to evaluate the effectiveness of oral sucrose solution on level of pain during DPT immunization among infants.

E X O_1

C O_1

E : Experimental Group

C : Control Group

X : Intervention (24% Oral Sucrose Solution)

O_1 : Post-test (Level of Pain)

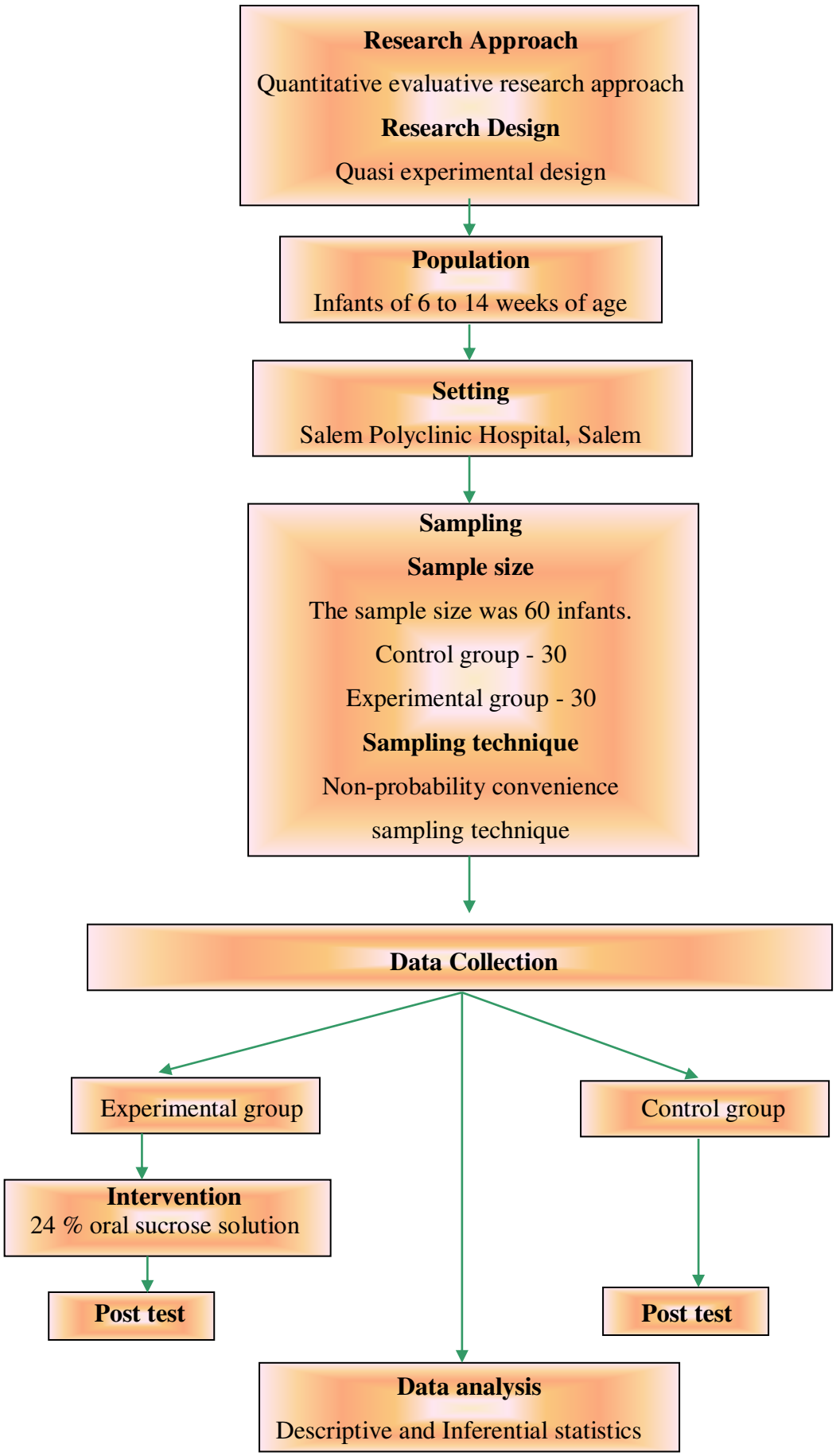

Fig (3.1) Schematic representation of research methodology

Population

Population for the present study were the infants between 6 to 14 weeks of age coming to outpatient pediatric department during the period of data collection and which comprised of approximately 100 infants.

Description of the Setting

The study was conducted in Sri Gokulam Hospital, Salem. The experimental and control group were selected in outpatient pediatric department of Salem Sri Gokulam Clink. It is about 46 km away from Swami Vivekananda College of nursing, Salem.

Sampling

Sample

Infants receiving DPT Immunization in out patient pediatric department of Sri Gokulam Hospital, Salem.

Sampling size

The sample size was 60 infants. 30 infants in experimental group were chosen during the first 15 days of data collection and the remaining 30 for the control group were chosen in the next 15 days.

Sampling technique

According to Ram. A (2001) convenience sampling is the research studies of all those persons who are most conveniently available or who accidentally come into contact during a certain period of time in the research.

Non- probability convenience sampling technique was used for selecting the sample for the study.

Criteria for sample selection

Inclusion criteria

- Infants between the age group 6 to 14 weeks.
- Infants of parents who are willing to participate in the study.

Exclusion criteria

Infants who were

- pre mature
- low birth weight
- with congenital anomalies.
- having any other major health problem.

Variables

Independent variable: 24% oral sucrose solution

Dependent variable: level of pain

Description of the Tool

This tool consists of two sections.

Section – I

This section consists of demographic data like age, weight of the infant, gender.

Section – II

This section deals with modified REILY infant pain observational checklist. It includes, Facial expression, Body movement, Cry, Activity, Consolability, which were as per the pain scale and the score was interpreted as follows:

Scoring procedure

Table 3.1 Scoring Procedure for assessing the level of pain

Observations	score			
	Severe	Moderate	Mild	No Pain
Facial expression	3	2	1	0
Body movement	3	2	1	0
Cry	3	2	1	0
Activity	3	2	1	0
Consolability	3	2	1	0

Each response was given a score of zero, one, two and three according to the level of pain as no pain, mild, moderate and severe pain respectively. The total score was 15. The total score for each infants was calculated and interpreted as follows

Table 3.2 Interpretation of scoring procedure

Level of pain	Score
Mild pain	0- 5
Moderate pain	6-10
Severe pain	11-15

Validity and Reliability

Validity refers to the degree to which an instrument measures what it is supposed to be measured **(Polit, D.F., and Hungler, 2003).**

The observational checklist constructed by the investigator was sent along with statement of the problem, objective and hypothesis to 6 experts (3 child health nursing specialist 2 pediatricians, 1 OBG Nursing specialist) for validating the tool. Minor modifications were made as suggested by the experts. The test of reliability

was determined by inter rater method. The reliability coefficient obtained for this study was r^1=0.90 which shows that the tool is reliable.

Pilot Study

The pilot study was conducted in Sri Gokulam Specialty Hospital, Salem. Validity and reliability of the instrument was tested during this time. Six children were selected. three infants for experimental group, Three infants were control group. The data were collected through observational checklist. The tools were administered and checked for its feasibility, language and appropriateness. The subject's chosen were similar in characteristic to those of the population under the study.

Based on the pilot study necessary changes were made in the checklist. The tool was found feasible and practicable. It also helped to select suitable statistical method for analysis.

Method of Data Collection

Ethical consideration

Prior to collection of data written permission was obtained from the managing director of Sri Gokulam Hospital, Salem.

Informed consent was obtained from mothers.

Period of data collection

The data collection was done for a period of 4 weeks from16.05.2018To15.06.2018

The data collection period for the experimental group was 2 weeks from 16.05.2018 To 31.05.2018 and for the control group was 2 weeks from 01.06.2018 To 15.06.2018

Data collection procedure

The experimental group was administered with 2 ml of 24% oral sucrose solution 2 minutes prior to DPT immunization where as the control group was not administered with oral sucrose solution. The investigator assessed the level of pain

during DPT immunization by using the modified REILY infant Pain Assessment Scale (Observation Checklist) for both experimental and control group.

Plan for Data Analysis

Data will be collected, arranged and tabulated. Independent 't' test will be used to find out the effectiveness of oral sucrose solution and chi-square will be used to associate level of pain of infants with their demographic variables.

Summary

This chapter dealt with methodology. It consists of research approach, research design, population, description of the setting, sampling, variables, description of the tool, validity & reliability, Pilot study, method of data collection, and plan for data analysis.

CHAPTER –IV

DATA ANALYSIS AND INTERPRETATION

Analysis is the process of the organizing and synthesizing data in such a way that question can be answered and hypothesis tested **(Polit D.F., and Hungler, 2003).**

This chapter deals with analysis and interpretation of data collected to evaluate the effectiveness of oral sucrose on level of pain during DPT Immunization among infants.

This Chapter Presents the Details of Data Analyzed and the Findings Under the Following Section.

Section - A Distribution of infants according to their demographic variables in experimental and control group.

Section - B Distribution of infants according to their level of pain in experimental and control group.

Comparison of mean, standard deviation, mean percentage and difference in mean percentage of level of pain among infants in experimental and control group.

Section - C Hypotheses Testing

a) Effectiveness of oral sucrose on level of pain during DPT Immunization among infants in experimental and control group.

b) Association between the level of pain of infants in experimental and control group and their demographic variables.

Section - A

Distribution of Infants according to their Demographic Variables in Experimental and Control group

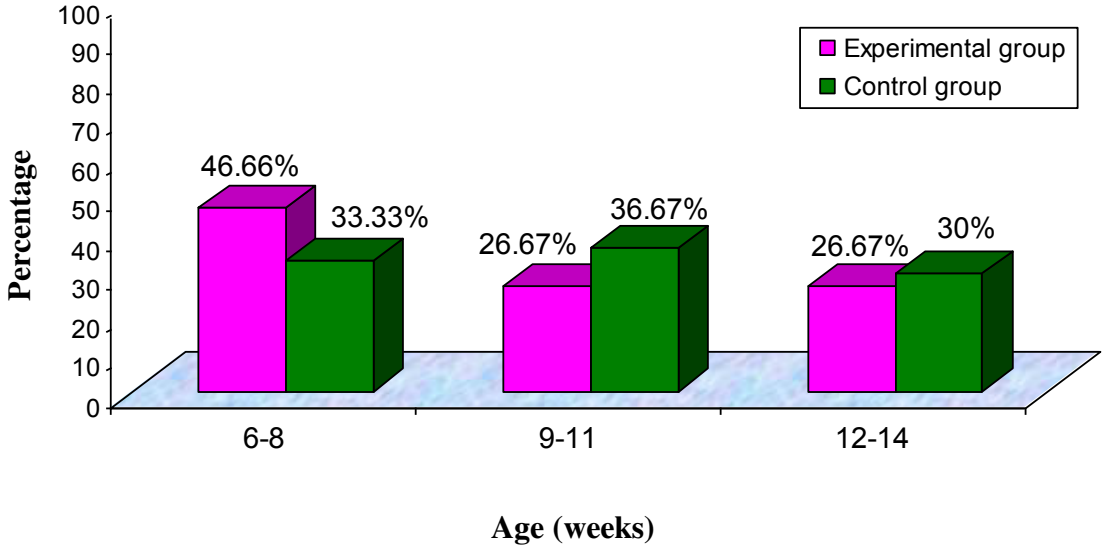

Figure - 4.1: Distribution of infants according to their age in experimental and control group

The distribution of infants according to their age shows nearly 50% of infants 14(46.67%) in experimental group and 10(33.33%) of infants in control group belonged to the age group of 6-8 weeks.

Further 8(26.67%) infants experimental group and 11(36.67%) infants in control group belonged to the age group of 9-11 weeks.

This reveals that most of the infants belonged to the age group of 6-8 weeks.

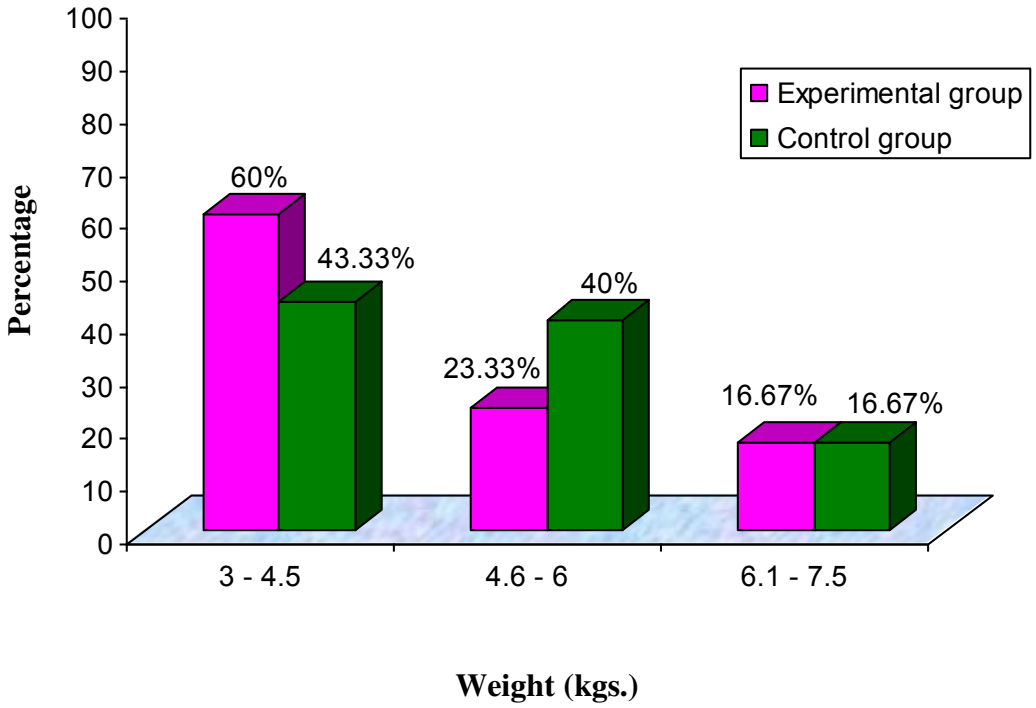

Figure - 4.2: Distribution of infants according to their weight in experimental and control group

Distribution of infants according to shows that highest percentage of them in experimental group 18(60%) and in control group 13(43.33%) were weighing between 3 to 4.5 kgs and lowest and similar percentage 5(16.67%) were weighting between 6.1 – 7.5 kgs. It might be related to age group of infants under study.

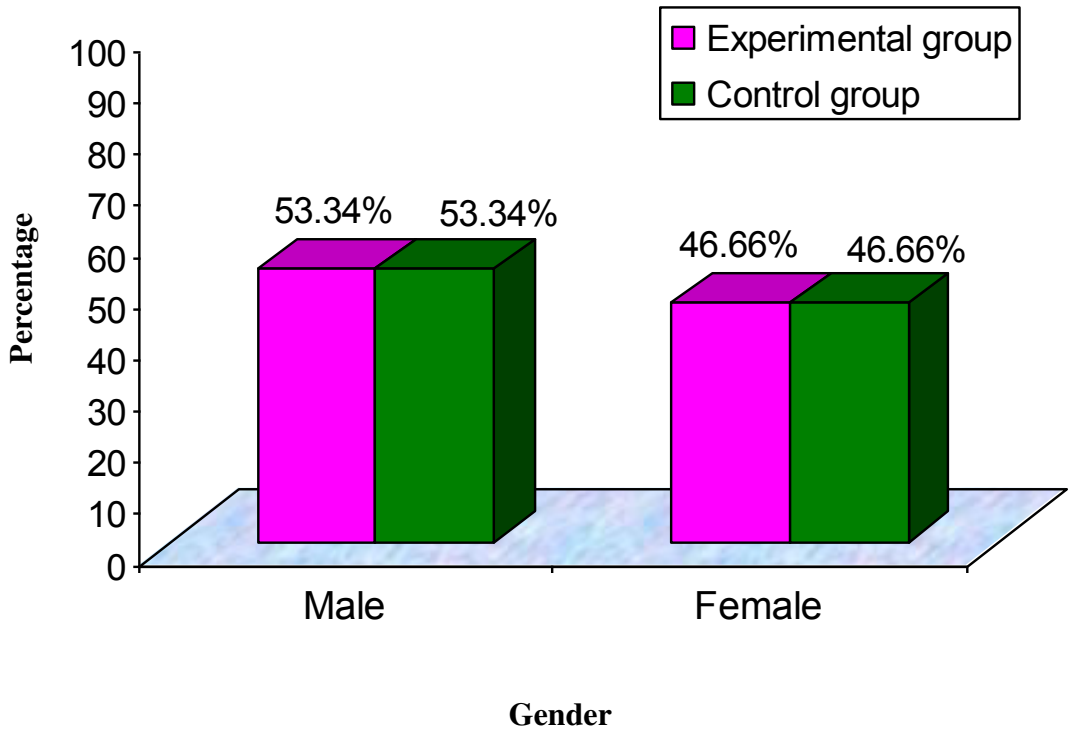

Figure - 4.3 Distribution of infants according to their gender in experimental and control group

Distribution of infants according to their gender reveals that similar and highest percentage of them 16(53.34%) in experimental group and in control group were males when compared to females who were also similar percentage 14(46.66%) in both the groups.

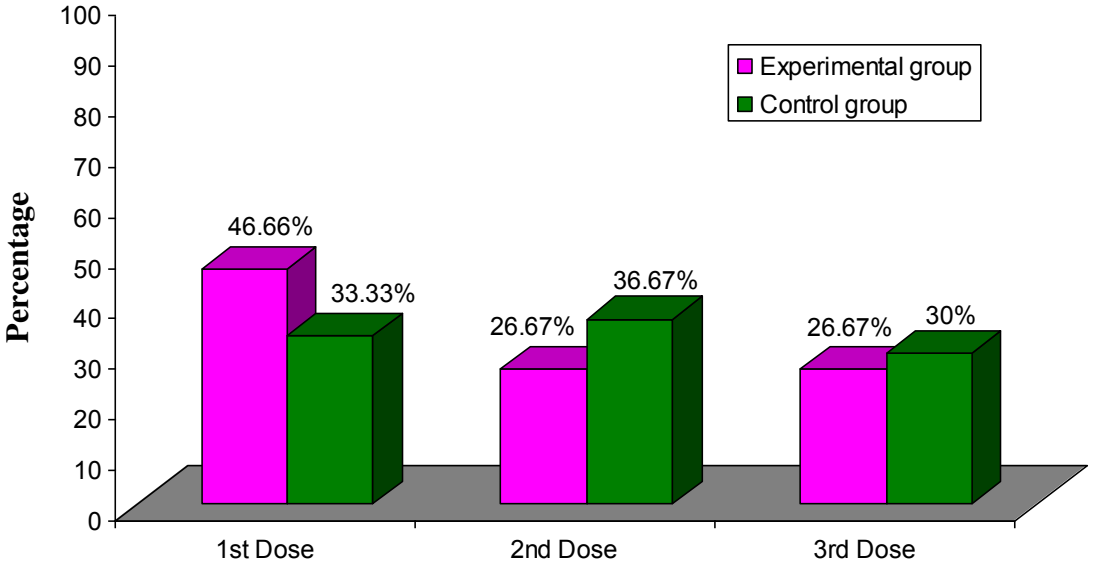

Figure - 4.4: Distribution of infants according to dose of DPT immunization in experimental and control group

The distribution of infants according to their dose of DPT immunization shows nearly 50% of infants 14(46.67%) came for their first dose in experimental and in control group 10(33.33%) came for their first dose.

Further 8(26.67%) infants came for their second dose in experimental group and in control group 11(36.67 %) infants came for their second dose.

This reveals that most of infants had come for the first dose of DPT immunization. It might be related to their age group.

Section –B

Distribution of Samples according to their level of Pain in Experimental and Control group

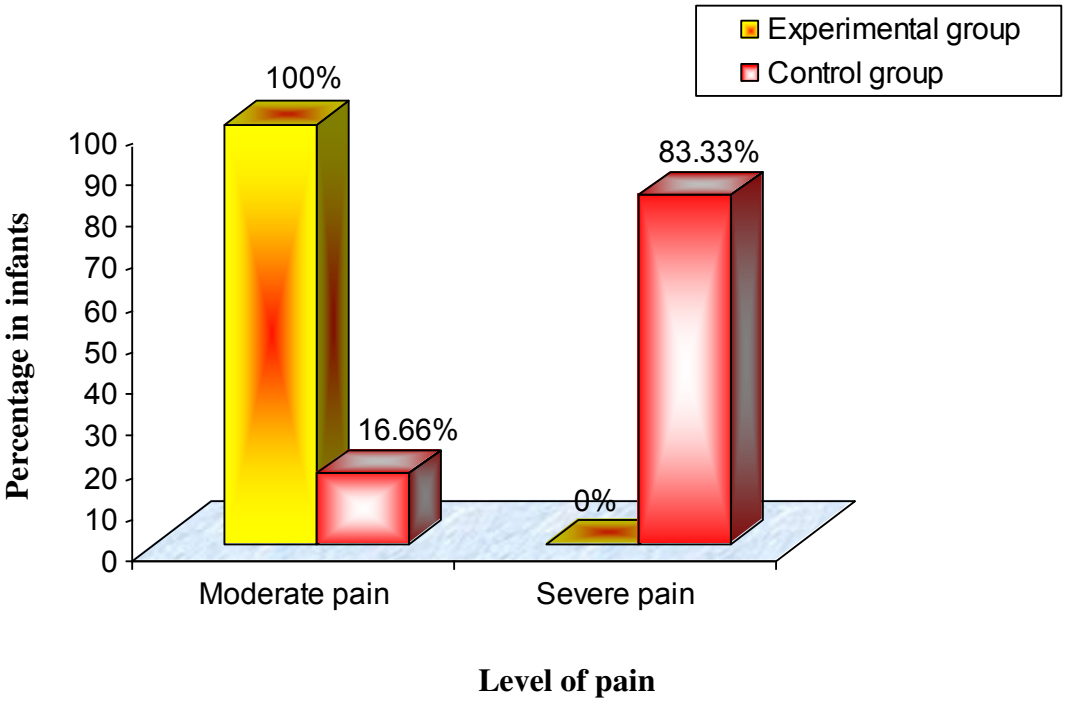

Figure - 4.5: Distribution of infants in experimental group and control according to their level of pain during DPT immunization.

Distribution of infants according to their level of pain shows that all the infants 30(100%) in experimental group had moderate level of pain and none of them had severe pain. However, in control group majority of them 25(83.33%) had severe pain.

This reveals that the level of pain in experimental group was reduced when compared to control group.

Table - 4.1:

Mean, standard deviation & mean percentage of level of pain among infants in experimental and control group

n=60

Group	Mean	S.D	Mean %	Difference in mean percentage
Experimental group	8.03	0.91	53.53	24%
Control group	11.63	1.17	77.53	

Mean, Standard Deviation & Mean Percentage of level of pain shows that the mean level of pain for experimental group was 8.03 $\pm$ 0.91 which shows a mean percentage of 53.53% whereas for control group it was 11.63 $\pm$ 1.17 showing a mean percentage of 77.53%. The difference in mean percentage was 24 indicating decreased level of pain in experimental group than in control group.

Section – C

Hypothesis Testing

Table - 4.2:

Effectiveness of oral sucrose on level of pain during DPT immunization among infants in experimental and control group

n=60

Group	Mean	S.D	df	t- value	Table value
Experimental group	8.03	0.91	58	13.33**	3.29
Control group	11.63	1.17			

** Highly Significant ($p < 0.001$)

Independent 't' test was done to evaluate the effectiveness of oral sucrose on level of pain among infants, shows that the mean level of pain for experimental group was 8.03 ± 0.91 whereas for control group it was 11.63 ± 1.17. The 't' value 13.33 which was greater than the table value at 0.001 level indicating the effectiveness of oral sucrose in reducing the level of pain in experimental group. Hence the research hypothesis (H_1) is retained.

Table - 4.3:

Association between the level of pain and demographic variables in control group

S. No.	Demographic Variables	Control group (n-30)		df	χ^2	Table value
		Moderate pain	Severe pain			
1	**Age**			2	0.538	5.99
	6 - 8 weeks	1	9			
	9 - 11 weeks	2	9			
	12 - 14 weeks	2	7			
2	**Weight of the infant**			2	1.615	5.99
	3 - 4.5 kgs	2	11			
	4.6 - 6 kgs	3	9			
	6.1 - 7.5 kgs		5			
3	**Gender**			1	7.976*	3.84
	Male	4	12			
	Female	1	13			
4	**Dose of DPT immunization**			2	0.538	5.99
	1st dose	1	9			
	2nd dose	2	9			
	3rd dose	2	7			

*significant ($p<0.05$)

The association for the experimental group was not calculated because there was no mild and severe pain.

There is no significant association in the level of pain with age, weight and dose of DPT immunization in control group. Hence the research hypothesis (H_2) is rejected, except for the variable gender, where significant association is found. Hence, the hypothesis (H_2) is retained.

Summary

This chapter dealt with data analysis and interpretation in the form of statistical values based on the objectives. Frequency and percentage distribution was found on level of pain during DPT immunization among infants with their selected demographic variables. The independent 't' test was used to evaluate the effectiveness of oral sucrose on pain during DPT immunization. The chi-square analysis was used to find out the association between the level of pain during DPT Immunization with their selected demographic variables

CHAPTER – V

DISCUSSION

This quasi-experimental study was done to determine the Effectiveness of Oral Sucrose on level of pain during DPT Immunization among infants at a Selected Hospital, Salem.

The findings of the study have been discussed with reference to the objective, relevant study from the review of literature.

Distribution of Infants according to their Demographic Variables

- Nearly fifty percentage of infants 14(46.67%) in experimental group and 10(33.33%) of infants in control group belonged to the age group of 6-8 weeks. Further 8(26.67%) of infants in experimental group and 11(36.67%) of infants in control group belonged to the age group of 9-11 weeks. This reveals that most of the infants belonged to the age group of 6-8 weeks.
- The highest percentage of them in experimental group 18(60%) and in control group 13(43.33%) was weighing 3 to 4.5 kgs and lowest and similar percentage 5(16.67%) were weighting between 6.1 – 7.5 kgs. It might be related to age group of infants under study.
- The similar and highest percentage of them 16(53.34%) in experimental group and in control group were males when compared to females who were also similar percentage 14(46.66%) in both the groups.
- Nearly fifty percentage of infants 14(46.67%) came for their first dose in experimental and in control group 10(33.33%) came for their first dose. Further 8(26.67%) infants came for their second dose in experimental group and in control group 11(36.67%) infants came for their second dose.

This reveals that most of infants had come for the first dose of DPT immunization. It might be related to their age group.

The First Objective of the Study was to assess the Level of Pain during DPT Immunization among Infants in Experimental and Control Group

Level of pain shows that all the infants 30(100%) in experimental group had moderate level of pain and none of them had severe pain. However, in control group majority of them 25(83.33%) had severe pain.

This reveals that the level of pain in experimental group was reduced when compared to control group.

The present study was supported by a study conducted by **Nail, et. al., (2004).** Various age appropriate tools are available to assist nurses to asses pain in infants, children and adolescents, however research continues to document that there is a lack of use of these tools by nurses. Inadequate pain assessment leads to inadequate selection of pharmacologic intervention for a child. This reveals that children and adolescents who undergo invasive procedures and surgeries continue to report moderate to severe level of pain.

The Second Objective of the Study was to Determine the Effectiveness of Oral Sucrose on Level of Pain among Infants in Experimental and Control Group during DPT Immunization.

Independent 't' test done to evaluate the effectiveness of oral sucrose on level of pain among infants shows that the mean level of pain for experimental group was 8.03 ± 0.91 whereas for control group it was 11.63 ± 1.17. The calculated 't' value 13.33 which was greater than the table value at 0.01 level indicating that the difference in mean was true difference. Hence, the research hypothesis (H_1) is retained

The present study was supported a study conducted by **Bucher, et al (1996)** on sucrose as analgesic agent for infants during immunization injections for 285 infants with a double blind randomized control trial. Infants received either no intervention or 2 ml of 12% sucrose solution orally 2 minutes before the administration of injection. The results suggested that sucrose significantly produced lesser cry in infant.

Stevens.B.et.al.(2007) conducted a study to evaluate the efficacy of sucrose as an analgesic agent when administered across a large sample of infants between the age group 2 weeks to 10 months, receiving intramuscular immunization. The results suggested that sucrose was effective in reducing injection pain in infants.

A study was conducted to assess the oral glucose as an analgesic to reduce infant distress following immunization at the age of three, five and twelve months. The results revealed that the administration of glucose reduced the mean crying time by 22% at three months, 62% at five months and 52% at twelve months. The research concludes that sweet solution can be used as a simple and safe method to reduce distress following immunization in infants up to twelve months **(Margit Thyr, et.al., 2007).**

The Third Objective of the study was to associate the Level of Pain during DPT Immunization among Infants in Experimental and Control Group with their Selected Demographic Variables

The association for the experimental group was not calculated because there was no mild and severe pain.

There is no significant association in the level of pain with age, weight and dose of DPT immunization in control group. Hence, the research hypothesis (H_2) is rejected, except for the variable gender, where the hypothesis is retained.

The present study was supported by **Strada M.E., et. al., (2008)** to compare the efficacy of oral sweet solutions to water or no treatment in infants aged 1-12 months during immunization. Randomized controlled trials (RCTs) were retrieved through internet searches or manual searches of reference lists. Sucrose or glucose, compared to water or no treatment decreased crying during or following immunization in 13 of the 14 studies. Infants receiving 30% glucose (three trials, 243 infants) had a decreased RR in crying incidence following immunization. With sucrose or glucose, there was a 10% reduction in proportion of crying time (95% CI -18 to -2) and reduction in crying duration (95% CI -23 to -0.7 s). Infants aged 1-12 months administered sucrose or glucose before immunization had moderately reduced incidence and duration of crying. It concluded that healthcare professionals should consider using sucrose or glucose before and during immunization.

Summary

This chapter dealt with the discussion of the study with reference to the objective and relevant studies. All the three objectives have been obtained. The research hypothesis (H_1) is retained, whereas the research hypothesis (H_2) is rejected except for the demographic variables, gender.

CHAPTER – VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter consists of four sections. In the first two sections, the summary and conclusion are presented. In the last two sections, the implications for nursing practice and recommendations for further research are presented.

Summary

Quasi experimental design, in which post – test only control group design was used in this study to determine the effectiveness of Oral Sucrose on level of pain during DPT immunization among infants. This study was conducted in Sri Gokulam Hospital, Salem. The sample size was 60 infants and were classified into experimental and control group by convenience sampling technique. Modified REILY infant pain assessment scale was used to collect the data. The data collected were analyzed using descriptive and inferential statistics. To test the hypotheses, independent 't' test and chi-square were used.

Findings of the study

The major finding of the study was summarized as follows.

- Nearly fifty percentage of infants 14(46.67%) in experimental group and 10(33.33%) of infants in control group belonged to the age group of 6-8 weeks. Further 8(26.67%) of infants in experimental group and 11(36.67%) of infants in control group belonged to the age group of 9-11 weeks. This reveals that most of the infants belonged to the age group of 6-8 weeks.
- The highest percentage of them in experimental group 18(60%) and in control group 13(43.33%) were weighing 3 to 4.5 kgs and lowest and

similar percentage 5(16.67%) were weighting between 6.1 – 7.5 kgs. It might be related to age group of infants under study.

- The similar and highest percentage of them 16(53.34%) in experimental group and in control group were males when compared to females who were also similar percentage 14(46.66%) in both the groups.
- Nearly fifty percentage of infants 14(46.67%) came for their first dose in experimental and in control group 10(33.33%) came for their first dose. Further 8(26.67%) infants came for their second dose in experimental group and in control group 11(36.67%) infants came for their second dose. This reveals that most of infants had come for the first dose of DPT immunization. It might be related to their age group.
- All the infants 30(100%) in experimental group had moderate level of pain and none of them had severe pain. However, in control group majority of them 25(83.33%) had severe pain. This reveals that the level of pain in experimental group was reduced when compared to control group.
- Independent 't' test done to evaluate the effectiveness of oral sucrose on level of pain among infants shows that the mean level of pain for experimental group was 8.03 ± 0.91 whereas for control group it was 11.63 ± 1.17. The calculated 't' value 13.33 which was greater than the table value at 0.001 level indicating the effectiveness of oral sucrose in reducing the level of pain in experimental group. Hence the research hypotheses (H_1) is retained.
- The association for the experimental group was not calculated because there was no mild and severe pain. There is no significant association in the level of pain with age, weight and dose of DPT immunization in

control group. Hence the research hypotheses (H_2) is rejected, except for the variable gender, where the hypotheses is retained.

CONCLUSION

This study was done to evaluate the effectiveness of oral sucrose on level of pain among infants during DPT immunization at a selected hospital, Salem. The result of this study showed that most of the infants in experimental group had reduction of pain during injection after administration of oral sucrose. There is no significant association in the level of pain with age, weight and dose of DPT immunization in control group, except for the variable gender, where significant association was found.

IMPLICATIONS

Nursing is a client centered profession. The findings of the study have implications in different branches of nursing i.e. nursing practice, nursing education, nursing administration and nursing research.

Nursing Practice

- 'Prevention' one of the present aims of health care delivery system has become the prime need. The nurses need to take responsibility in preventing pain during common routine invasive procedures such as injection and venipunctures in the hospitals.
- At the community level during the immunization programme, the administration of sucrose before immunization requires a culturally sensitive motivation and educational programme. Hence the nurses have to be trained regarding the use of oral sucrose for pain reduction as non-pharmacological intervention.

- The nurse have to give more emphasize to the infant's pain during painful procedures. Hence sucrose administration can be initiated in reducing DPT immunization injection pain.

Nursing education

- The nursing students have to be trained on the beneficial effects of sucrose and have updated knowledge on recent practices/trends of non pharmacological intervention to reduce behavioural and psychological changes for pain to injection.
- The nursing students should be educated on the pharmacological properties of sucrose as analgesic to reduce pain in short duration procedures. Therefore the practice of oral sucrose administration in the reduction of pain will alleviate mother's hesistance to injections causing pain in infants.
- The analgesic effect of oral sucrose should be taught to the nursing students and the community health workers to increase the compliance DPT immunization for infants.

Nursing administration

- The nurse administrators will have to revise policies and standards for intervention to reduce pain in infants. Sucrose solution should be made available to the hospitals and the community.
- Through in-service education, continuing nursing education and written policies, emphasis on oral sucrose administration to relieve procedural pain has to be put up in the relevant wards of hospitals and public health centers for the nursing staff.
- The nurse administrator should be ensured that the sucrose administration practice is implicated before DPT immunization.

- Media is one of the best methods of disseminating the benefits of oral sucrose administration before DPT immunization.

Nursing research

- The study will be a valuable reference material for future researchers.
- The findings of the study would help to expand the scientific body of professional knowledge upon which further researcher can be conducted.
- Oral sucrose solution may be studied more scientifically and used as a specific nursing intervention.
- Large-scale studies can be conducted in consideration of other contributing variables.
- Sucrose solution can be administered after the pick of DPT immunization

RECOMMENDATIONS

The study recommends the following for future research.

- The same study can be repeated with the large samples to generalize findings.
- A study can be done to assess the analgesic effect of breast feeding in procedural pain in neonates.
- A comparative study can be done with sucrose and breast milk in normal healthy full term neonates who are undergoing painful procedures.
- A study can be done to assess the effectiveness of 25% sucrose, 50% sucrose and 75% sucrose in infants receiving routine immunizations in reducing pain.
- A study can be done to assess the differential effects of sucrose, glucose, fructose and lactose on crying in infants 1 to 3months old during painful procedures.
- A study can be done to assess the effectiveness of non nutritive sucking in reducing procedural pain in neonates.

- A study can be done to assess the effect on needle length on incidence of local reactions to routine immunization in infants aged 4 months.
- A study can be done to compare acute pain response during immunization in infants using a slow standard of care injection technique versus a rapid pragmatic technique.

APPENDIX -B

Tool for Data Collection

This tool consist of two sections.

Section I- Demographic Data.

Section II- Modified REILY Infant Pain Assessment Scale

Section - I

Demographic Data

Date: **Sample No :** ☐☐

1. Age in weeks
   a) 6 - 8 weeks ☐
   b) 9 - 11 weeks ☐
   c) 12 - 14 weeks ☐
2. Weight of the infant (kgs)
   a) 3-4.5 ☐
   b) 4.6-6 ☐
   c) 6.1-7.5 ☐
3. Gender
   a) Male ☐
   b) Female ☐
4. Dose of DPT immunization
   a) 1st dose ☐
   b) 2nd dose ☐
   c) 3rd dose ☐

Section - II

Modified REILY Infant Pain Assessment Scale

Sl.No.	Assessment	Score	Place (▤) mark in appropriate score
1.	**Facial Expression**		
	Smiling.	0	
	Angry/worried twisting face.	1	
	Mouth opened.	2	
	Full cry expression.	3	
2.	**Body Movement**		
	Calm/relaxed.	0	
	Restless/keep moving the body.	1	
	Moderate mobility.	2	
	Hitting very fastly.	3	
3.	**Cry**		
	Whimpering/mouring.	0	
	Low weak cry.	1	
	Vigorous crying.	2	
	Screaming/high pitch cry.	3	
4.	**Activity**		
	Active/alert.	0	
	Seeks for mother.	1	
	Withdraw legs.	2	
	Excessive body jerk.	3	
5.	**Consolability**		
	Relaxed	0	
	Easy to console	1	
	Difficult to console	2	
	Inconsolability	3	

Score key for Modified REILY infant pain assessment scale

Pain reaction of the infant is rated from 0-3.

- **0** - No pain
- **1** - Mild pain
- **2** - Moderate pain
- **3** - Severe pain

Score interpretation

The total score is 15. The score interpretation is follows

Level of pain	Score
Mild	0-5
Moderate	6-10
severe	11-15

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INTERVENTION

Sucrose

Sucrose is a disaccharide that is composed of glucose and laevulose that further limits the immediate absorption of carbohydrate, sucrose is one of the most important sugar of the human diet. It is widely distributed in plants, particularly in the sugar cane and sugar beat. During hydrolysis sucrose gives on molecular of glucose and one molecular of fructose.

Sucrose is widely used to manage procedural pain in infants during immunization standard dosage have not been determined. In actual practice nurses use infant pain ones to determine how much to administer.

Mechanism

Sucrose is sweet in taste and do not rely on systemic absorption. The analgesic action of sucrose may involve descending pain modulation mechanisms, with inhibition of pain transmission at the spinal level. The presence of sucrose in the mouth also may stimulate the release of endorphins from the hypothalamus.

Materials

- 24% oral sucrose solution
- Dropper
- Small towel

Procedure

After getting consent from the mother, 2 ml of 24 % sucrose solution was administered orally by using dropper. The DPT immunization procedure was performed two minutes after the oral administration of sucrose. Data related to behavioural cues during the painful procedure was assessed with the help of modified REILY infant pain assessment scale.

APPENDIX - C

Letter Requesting opinion and Suggestions of Experts for Content Validity of the Research Tools

From

Thirumurugan.A
M.Sc., (Nursing) II Year
Swami Vivekananda College of Nursing,
Dharmapuri.

To

Respected Sir/ Madam,

Sub: Requesting opinion and suggestions of experts for establishing content validity of the tools.

I, Mr. Thirumurugan.A. a Final Year M.Sc., (Nursing) student of Swami Vivekananda College of Nursing, Dharmapuri, in partial fulfillment of Master's Degree in Nursing, have selected the topic mentioned below for the research project to be submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

Topic: "A Study to Assess the Effectiveness of Oral Sucrose on Level of Pain during DPT Immunization among Infants at Selected Hospital, Dharmapuri." I request you to kindly validate the tool and content and give your expert opinion for necessary modification. I will be grateful to you for this.

Thanking you.

Place : Dharmapuri
Date :

Yours' sincerely,

Mr. Thirumurugan.A

Enclosed:

1. Certificate of validation
2. Criteria checklist of evaluation of tool and content
3. Tool for collection of data
4. intervention

APPENDIX - D

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by, Mr. **THIRUMURUGAN. A**, final year M.Sc (N) student, Swami Vivekananda College of Nursing, (Affiliated to the Dr. M.G.R. Medical University) is validated and can proceed with this tool and conduct the main study for dissertation entitled **"A Study to Assess the Effectiveness of Oral Sucrose on level of Pain during DPT Immunization among Infants at Selected Hospital**."

Place :

Date :

Signature of the Expert

Name and designation

APPENDIX - D

CERTIFICATE OF VALIDATION

This is to certify that the tool developed by, Thirumurugan.A , final year M.Sc (N) student, Swami Vivekananda College of Nursing, Dharmapuri, (Affiliated to the Dr. M.G.R. Medical University) is validated and can proceed with this tool and conduct the main study for dissertation entitled **"A Study to Assess the Effectiveness of Oral Sucrose on level of Pain during DPT Immunization among Infants at Selected Hospital, Salem."**

Place :

Date :

Signature of the Expert

Name and designation