

Effectiveness of Oral Sucrose on Level of Pain among Infants after Pentavalent Immunization.

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Abstracts:

Oral sucrose is a mild analgesic that can only be used in the clinic to relieve discomfort during minor procedures. An increase in endogenous opioid via oral administration is the mechanism. It's a perfect method for treating short-term pain because the analgesic effect. Managing pain in children during painful procedure is a vital role of paediatric nurse. The administration of oral sucrose to assess the level of pain was found effective in the previous article. To enhance the evidence-based practice the current study with purpose to reduce level of pain during pre-administration of oral sucrose is undertaken. The purpose of the study was to assess level of pain after pentavalent immunization for experimental group and Control group and then to compare both the level of pain with experimental and Control group. A study was implemented by Quantitative research approach and quasi experimental post-test research design was used. The sample size was 36 where 18 each samples were included form experimental and control group. Non- Probability, Convenient sampling technique was used as sampling technique. Neonatal Infant Pain Scale (NIPS) was used as an observational scale to assess the pain. . The data was conducted at Immunization Units of Bharati Hospital- Sangli, Gadare Hospital-Haripur and PHC no 2 of Sangli Miraj Kupwad Corporation area. 30 experts validated the tool. The collected data was used for data analysis. Analysis and interpretation was analysed on 36 infants, these infants were categorized in two groups where the infants who received oral sucrose after pentavalent immunization were the experimental group and the infants who didn't received were said to be control group after analyses it was seen that "p" value is 0 which is less than 0.05 that indicates significant difference in pain score between the two groups. Experimental group experienced lesser pain than control group that indicates, oral sucrose in reducing level of pain was seen to be effective.

Keywords: Effectiveness, Oral Sucrose, Level of Pain, Infants, Pentavalent Immunization.

INTRODUCTION:

Background of Study

Pain can be experienced by all children, including newborns. Untreated pain may affect the structure and function of the nervous system, so they can need pain relief in this situation. Later in life, this may lead to abnormal pain sensitivity and the complications that come with it. The neonate's degree of pain perception continues to be questioned. During infancy reflexive behavior is dominant between 3 and 10 month of the age infants are able to localize pain as they withdraw their limbs, stool, hiccoughs and cry.¹ Scientific techniques finally established babies definitely do experience pain probably more than adults and developed reliable means of assessing and of treating it. As recently research, it was commonly stated that babies could not feel pain until they were a year old, but today it is believed newborns and likely even fetuses beyond a certain age can experience pain. Infants may be exposed to traumatic experiences on a regular basis. They may be subjected to intubations, tracheal aspirations, blood screening, vein in cannulations, and other painful procedures in a neonatal intensive care unit, they may also be subjected to surgery, lumbar puncture, chest air leak drainage, and other procedures.²

After an injection the new born baby react in the diffuse way crying and making generalized body movements , the infants who are few month old may not respond immediately but may begin to cry after few minutes .Vaccines are intended to activate a child's immune system, allowing his body to fight off and "know" particular germs. According to the Centers for Disease Control and Prevention (CDC), if these germs attack again, his immune system will be able to effectively fight them. The common side effects that children experience after vaccination are a fundamental part of the body's infection-fighting efforts.³ Fever reducers had a smaller impact on the immune system response of infants and children, according to a later analysis of studies, especially after they had booster shots.⁴

Sugar has been shown in many studies to not only assist in the absorption of drugs, but also to reduce the sting of vaccine pain. Sugar is particularly beneficial to babies under the age of six months. Treating pain in newborns is important for many reasons, the first of which is ethical, and the second of which is that pain can lead to reduced oxygenation, hemodynamic instability, or increased intracranial pressure. Furthermore, a traumatic event early in life may lead to somatization later in life. Many newborn babies are exposed to invasive procedures such as heel pricks, venipuncture, and intramuscular injections, which can be painful. ⁵

Need of the Study

Pain management is the major aspect of nursing care as, care giver for children nurses are need to minimize the emotional and physical effect of painful procedures. The main responsive pediatric nurse is to ease pain and provide comfort to the children. Inadequate pain management could increase in children's discomfort, stress and decreased coping abilities. It is important to analyze the painful experience while the child is hospitalized or receiving the medical treatment hence the painful experiences may cause physical and psychological changes in the infant. Prevention of pain whenever possible is the best thing on the management of pain in infants. Various studies published related to the sweet taste induce calming and analgesia in human infant have been identified. Sucrose is the widely recommended for routine use during the painful procedure in newborn. A study is conducted to assess the use of oral sucrose which has been mostly extensively studied pain intervention in infant care to date. The aim of that study is to revive what is known about the mechanism of the sucrose because analgesia highlights existing evidence and knowledge gaps.⁶

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Current controversies and provide direction for the future research practice. Breastfeeding helps to relieve the pain in infants by comforting diversion with the sucking physical sensation of skin to skin contact and sweet taste of breast feed and other chemical producing analgesia and relaxation, breastfeeding has many other advantages it is non-pharmacological method easily accessible without any side effect it is perfect pain reliever it is natural safe and free intervention.⁷

Studies with the preterm infants that have examine the use of oral sucrose as an analgesic during heel stick and venipuncture have shown that sucrose is effective in reducing pain. Sucrose may also be combined with non-nutritive sucking to provide significant pain relief. The use of oral sucrose is now recommended with a wide range of painful procedures in the NICU. One new pain relief intervention under study is the administration of oral sucrose which may active endogenous opioid system within the body.⁸

To alleviate procedural pain in neonates, international clinical recommendations suggest giving oral sucrose. These guidelines are based on the findings of many randomized controlled clinical trials that prove sucrose is successful in reducing pain in preterm and term neonates. These guidelines are based on the findings of many randomized controlled clinical trials that show sucrose reduces pain in preterm and term neonates. Vaccination is the most common procedure performed in children, but new parents may be concerned about the discomfort associated with routine vaccination, which can disrupt mother-infant bonding. Sucrose has only been used in a few studies after neonatal age. The aim of this study was to see whether 24 percent sucrose had an analgesic impact in healthy infants after they had received pentavalent vaccination. The above studies show that Oral sucrose is a safe and effective mild analgesic which is effective in decreasing short-term pain and distress during minor procedures. Small amounts of sucrose solution is effective to reduce procedural pain.⁹ Oral sucrose is a mild analgesic that can only be used in the clinic to relieve discomfort during minor procedures. An increase in endogenous opioid via oral administration is the mechanism. It's a perfect method for treating short-term pain because the analgesic effect.¹⁰

Problem Statement

“A study to assess the effectiveness of administration of oral sucrose on level of pain among infants after pentavalent immunization in selected immunization units of Sangli, Miraj, Kupwad Corporation area.

Objectives of the Study

1. To assess level of pain after pentavalent immunization for experimental group
2. To assess level of pain after pentavalent immunization for control group
3. To compare level of pain among experimental and control group.

Operational Definitions:

1. Assess

In this study, **Assess** refers to approximate score of pain after administration of pentavalent immunization in the infants through the observation using Neonatal infant pain scale (NIPS) and expressed statistically.

2. Effectiveness

In this study, **Effectiveness** refers to observation of change in pain score after pentavalent immunization among the infants through observation scale by i.e. NIPS.

3. Oral sucrose

In this study, **Oral sucrose** refers to preparation of 24 % oral sucrose by adding 24gm of sugar in 100 ml of boiled water and cooled at room temperature.

4. **Infants**

In this study **Infant** refers to a child receiving 1st, 2nd and 3rd dose of pentavalent vaccine.

Hypothesis:

H₀: There is no significant difference in level of pain between experimental group and control group after pentavalent immunization.

H₁: There is significant difference in level of pain between experimental group and control group after pentavalent immunization.

Material and Methods:

Research Approach

The present study was to evaluate effectiveness of oral sucrose administration on level of pain among infants after pentavalent immunization; hence quantitative research approach was adopted to achieve the objectives of the study.

Research Design

The investigative plan, structure, and strategy are all part of the study design in assessing level of pain. To evaluate effectiveness of oral sucrose administration on level of pain among infants after pentavalent immunization the experiment was conducted in two groups viz; Experimental and Control group the data was collected and interpreted after Pentavalent immunization and hence quasi experimental post-test design was used for the present study.

Variables of study

- 1) Independent Variables – Oral sucrose
- 2) Dependent Variables – Pain in infants after pentavalent immunization.

Research Setting

For Pilot study, the 5 samples for experimental group were taken from PHC center no. 6 and 5 samples for control group were taken from PHC center no. 2 of Sangli Miraj Kupwad Corporation Area. The main study was conducted at Immunization Units of Bharati Hospital- Sangli, Gadare Hospital-Haripur and PHC no 2 of Sangli Miraj Kupwad Corporation area.

Population: Infants receiving pentavalent immunization.

Sample: Infants receiving pentavalent immunization in selected immunization unit of Sangli Miraj Kupwad Corporation area.

Sample Size: The sample for the study include 36 infants (18 for experimental group and 18 for sample control group)

SAMPLING CRITERIA

1) Inclusion Criteria

- Infant receiving 1st, 2nd, and 3rd dose of pentavalent immunization.
- Care takers who are willing to participate in the study.

2) Exclusion Criteria –

- Infant clinically diagnosed with congenital diabetic mellitus
- Infant contraindicated for pentavalent immunization.
- Infant with sucrose intolerance.

DATA COLLECTION TOOL AND TECHNIQUE

Description of Tool –

The tool consists of two sections.

Section I: Demographic variables of infant

Section II: Observational Scale (Neonatal infant Pain scale)

VALIDITY –

The experts were selected from various fields based on the topic. Research tools were sent to 33 experts out of which, 30 experts validated the tool. Where 4 were Pediatric Consultants, 11 from Child Health Nursing specialty, 4 from Community Health Nursing specialty, 5 from Medical Surgical Nursing Specialty, 3 from Mental Health Nursing specialty, 1 from Obstetrics and Gynecology specialty and 2 were Biostatistician. After obtaining their guidance and suggestion, the tool was modified whenever necessary after discussion with the guide.

Ethical Consideration

The willing participants in the study were given consent letters to uphold the study's ethical boundaries. The samples were also told that the confidentiality of the obtained data would be retained. The oral sucrose solution was prepared in hygienic method.

Procedure for Data Collection –

Formal permission was taken from the head of Immunization unit. The samples were categorized in two groups viz: experimental group and control group. Oral sucrose was administered orally 2 minutes prior to immunization, after administration of pentavalent vaccine, level of pain perception was assessed in experimental group, where as in control group level of pain was assessed after pentavalent immunization without any intervention.

Preparation of 24% sucrose solution:

1. 100 ml of boiled water added with 24gms of sugar.
2. The solution cooled at room temperature and used for administration in this study.
3. The preparation of 24% Oral sucrose was prepared using hygienic precautions.
4. The solution of oral sucrose was freshly made daily, once the solution used in the procedure was discarded within 24 hours.

Plan for Data Analysis

Descriptive statistics like Mean, median, mode, Range and standard deviation and inferential statistics like Chi- square test and unpaired t-test was used for data analysis

Reliability

Observation Scale i.e. Neonatal Infant Pain Scale was used to assess the level of pain. The reliability of the tool was done by Abbas Ebadi Baqiyatallah University of Medical Science and reliability of the tool is $r=0.949$ which is less than 0.001. It was checked by inter rater method.

Pilot Study

The pilot study was conducted on 25th March 2020 on 10 infants, in which 5 samples were from experimental group and 5 samples from control group were included from PHC. The pilot study was found feasible to conduct final study.

RESULTS AND DISCUSSIONS:

The data is analyzed on the basis of the objectives and formulated Hypothesis of the study.

1. To assess level of pain after pentavalent immunization for experimental group
2. To assess level of pain after pentavalent immunization for control group
3. To compare level of pain among experimental and control group

PILOT STUDY ANALYSIS

Table No 1.
Comparison of pain in experimental group and control group for Pilot study

n=18+18

	Experimental group	Control group	t value	p value	Conclusion
Mean	2.17	5.17	4.107919	0.00928	Significant
S.D.	1.72	1.94			

Level of significance is at 5 %

Table No 1. states that, p value is less than 0.05 hence it is concluded that there is a significant difference in level of pain between experimental & control group and oral sucrose administration is effective in reducing the pain during pentavalent immunization.

ORGANIZATION OF FINDINGES:

The collected information was organized and presented in four sections as follows:

- Section I** : Description of socio-demographic characteristics of samples.
Section II : Level of pain in experimental group during pentavalent immunization
Section III : Level of pain in control group during pentavalent immunization
Section IV : Comparison of pain in experimental group and control group.

SECTION 1: DISRIBUTION OF SOCIO-DEMOGRAPHIC VARIABLES OF SAMPLES.

Table No. 2.

Frequency and percentage distribution of socio demographic variables.

n=18+18

Age (in weeks)	Experimental group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
6-9	9	50.00	6	33.33
10-13	6	33.33	7	38.89
14 & above	3	16.67	5	27.78
Gender				
Female	9	50.00	6	33.33
Male	9	50.00	12	66.67
Weight (grams)				
2500-3000	8	44.44	7	38.89
3001- 3500	7	38.89	6	33.33
3501-4000	1	5.56	2	11.11
4001 & above	2	11.11	3	16.67
Dose of pentavalent immunization				
1 st	9	50.00	6	33.33
2 nd	6	33.33	7	38.89
3 rd	3	16.67	5	27.78
H/O NICU PICU				
Yes	0	0.00	0	0.00
No	18	100.00	18	100.00

Table no. 2 – shows that for **Age in weeks**, for control group 33.33% of babies were born between the age of 6-9 weeks, 38.89% were born between 10-13weeks and group 27.78% the babies were between 14 and above weeks where in experimental group 50.00% were born between 6-9 weeks were as 33.33% weeks were born between 10-13 weeks and 16.67% infants were born between 14 and above weeks. There were 50% of female and 50% males in experimental group and 33.33% of females and 66.67% males in control group. 44.44% and 38.89% babies were having weight between 2500- 3000 in experimental and control group respectively. In the range of 3001-3500 grams, 38.89% babies are in experimental group and 33.33% females are in control group. 5.6% of babies in experimental group and 11.11% babies in control group were in the range of 3501-4000. 11.11% of babies in experimental group and 16.67% in control group were 4001grams and above. Out of three doses of pentavalent immunization, for 1st dose there were 50%, 2nd Dose 33.33% and 16.67% of babies took 3rd dose in experimental group, where as 33.33% babies took their 1st dose, 38.89% took 2nd dose and 16.67% of babies took 3rd dose during data collection in control group. None of the infant had a history of NICU/PICU admission due to history of illness.

SECTION II : LEVEL OF PAIN IN EXPERIMENTAL GROUP DURING PENTAVALENT IMMUNIZATION

TABLE NO. 3
Pain Score of experimental group during pentavalent immunization

n=18

Pain level	Pain score	Experimental group	
		Frequency	Percentage
No pain	0-2	7	38.89
Moderate pain	3-4	11	61.11
Severe pain	4- above	0	0.00

Table No. 3 indicates 61.11% infants i.e. 11 infants experienced moderate level of pain and 38.89% of experience no pain during administration of oral sucrose whereas no infant had severe pain.

n=18

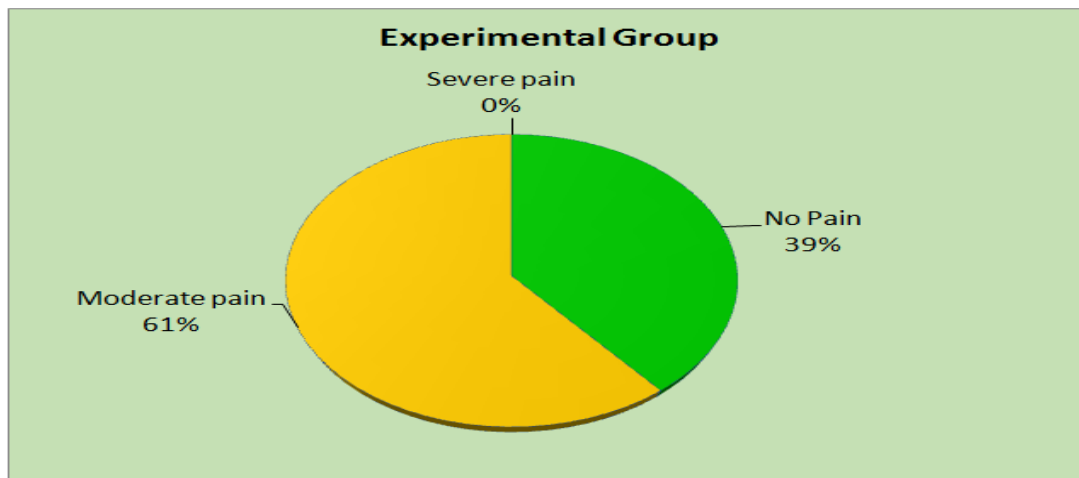


Figure no. 1. Pain Score of experimental group

SECTION III : LEVEL OF PAIN IN CONTROL GROUP DURING PENTAVALENT IMMUNIZATION

Table no. 4
Pain Score of experimental group during pentavalent immunization

n=18

Pain level	Pain score	Control Group	
		Frequency	Percentage
No pain	0-2	0	0.00
Moderate pain	3-4	3	16.67

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Severe pain	Above 4	15	83.33
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Table No 4 indicates, 15 infants out of 18 experienced severe pain after pentavalent immunization without any pain reducing agents whereas 16.67% i.e. 3 infants had moderate pain and no infant was free from pain.

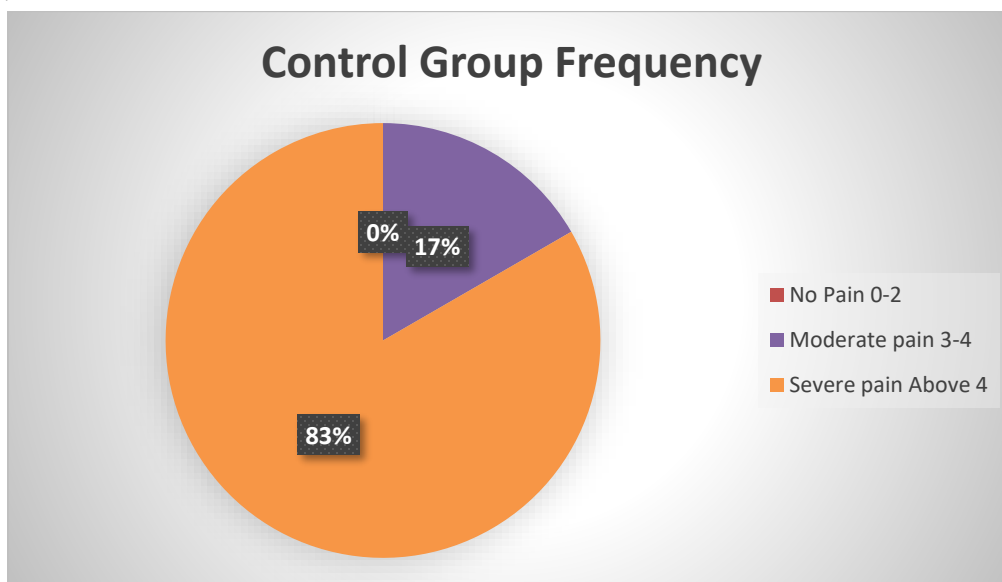


Figure no. 2. Pain Score of Control group

SECTION IV : COMPARISON OF PAIN IN EXPERIMENTAL GROUP AND CONTROL GROUP

Table no. 5
Level of Pain between Experimental and Control Group

n= 36

Group	Frequency	Mean	S .D	T Value	P Value
Experimental Group	18	2.72	0.67	-9.71	0
Control Group	18	5.56	1.04		

Level of significance is at 5 %

Table No 5 denotes the final result, as the mean pain score of experimental group was 2.72, SD was 0.67 and mean of pain score for control group was 5.56 and SD is 1.04, "P" value is 0 which is less than 0.05 that indicates significant difference in pain score between the two groups and hence Null Hypothesis is rejected.

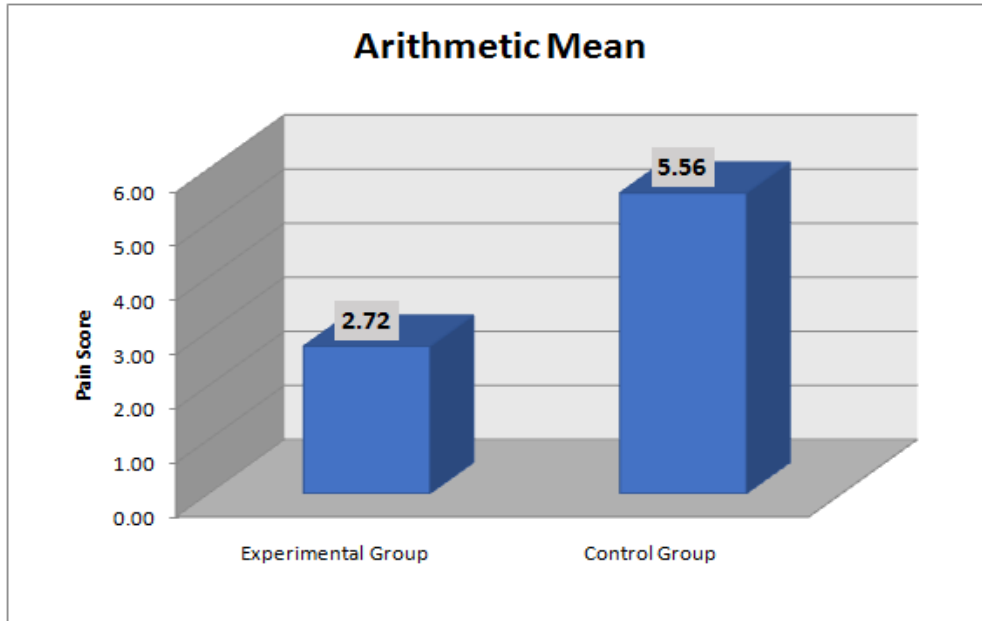


Figure no. 3. Comparison of mean Pain score in Experimental Group And Control Group

Fig no.3. Confirms that mean pain score of experimental group with oral sucrose was less as compared to control group which indicates infants receiving oral sucrose experienced lesser pain than infants who don't hence oral sucrose in reducing level of pain was seen to be effective.

CONCLUSION:

The effect of oral sucrose on administration of pentavalent immunization suggested that it may act like a sensory stimuli on pain. The mechanism of sweet test induced the calming effect and can be used as analgesia in the infant. Following the principal in a present study the investigators decided to select infants between 6 weeks to 14 weeks above the age accounts for maximum percentage of immunization units. In one of the study conducted in the immunization unit among the infant shows that the sweet test induced the coming effect in infant and it helped in reducing pain. Above in the both the group that is 66.67% male and 33.33% female in control group and 50% male and 50% female in experimental group.

Results from the study shows that in the control group children were in severe pain whereas they had no infant with severe pain in experimental group, the data shows that severe pain is less in experimental group compared to control group .Several studies shows that the sweet test help in reducing pain in infants.

REFERENCNS

1. Terri Kyle MSN CPNP ; Untreated pain in the infant affect the structure and function of Nervous system ; Textbook of pediatrics Nursing 2002; page no.380
2. Lippincott Williams and Wilkins ; Textbook of pediatrics Nursing ; Painful procedures in the infant ; 2003 page no. 292

3. Terri Kyle MSN,CPNP untreated pain in the infant affect structured and function of nervous system ; Text book of pediatrics Nursing : 2002 , page no.380
4. Barbora A Redding administering painkillers during the vaccination to reduce pain in child Textbook of paediatric 2002;Page no. 409
5. Walters Kluwer non-pharmacological pain relive er methods physiology of pain textbook of paediatric nursing 2009; Page no.380
6. Harrison, D., Loughnan, P., Manias, E., Gordon, I., & Johnston, L. (2009). Repeated doses of sucrose in infants continue to reduce procedural pain during prolonged hospitalizations. *Nursing Research*, 58(6) 427-434.
7. Shah, P., Herbozo, C., Aliwalas, L., & Shah, V. (2012). Breastfeeding or breast milk for procedural pain in neonates. *Cochrane Database of Systematic Reviews*;12, Art. No.: CD004950. DOI: 10.1002/14651858.CD004950.pub3.
8. Carbajal R, Rousset A, Danan C. Epidemiology and treatment of painful procedures in neonates in intensive care units. *Journal of the American Medical Association*.2008;300, 60-70
9. Pasek, T. & Huber, J. (2012). Hospitalized infants who hurt: a sweet solution with oral sucrose. *Critical Care Nurse*; 32(1), 61-69
10. Moknack, L. et al. (2010). NICU procedures are getting sweeter: development of a sucrose protocol for neonatal procedural pain. *Neonatal Network*; 29(5), 271-279.
11. Dr. P. Muthulakshmi . Effectiveness of oral sucrose solution on pain perception during immunization: October 2018 ; Reg. No. 301616102.
12. Maninderjit Kaur , Gopal Singh Charan. Effectiveness of oral sucrose on level of pain during pentavalent vaccination : *International Journal of Health Science and Research* : Vol (8) : Issue : 6 ; June 2018 ; ISSN : 2249-9571
13. Mr. Thinumunigan , Mrs. Thangamani M . Effect of oral sucrose on pain during immunization : October 2018 ; Reg. No. 301617754.
14. Chattopadhyay Dipankar , Kundu Purnima et.al. Effect of oral sucrose on pain during DPT immunization. *Indian Journal of Public Health* , Vol(55) , Issue 2 , April-June: 2011 ; IP : 198.108.124
15. Dr. K. Jeyabarathi , Ms. Arunima Mohan . Effect of oral sucrose on pain perception among infants receiving immunization : *International Journal of Advance Research* : 2019 ; ISSN No. 2320-5407
16. Rohini Dani Clinical Instructor, College of Nursing, Bharati Vidyapeeth (Deemed to be University) Sangli; Effect of Ice Pack Application on Pain During Venipuncture among the Children Admitted in Selected Pediatric Units of Sangli, Miraj, Kupwad Corporation Area; *Indian Journal of Public Health Research & Development*, August 2019, Vol.10, No. 8
17. Sibel Kucukoglu, Sirin Kurt, and Aynur Aytakin. The effect of the facilitated tucking position in reducing vaccination-induced pain in newborn <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4546124/>
18. Gyan Jyoti, Smriti Arora, Bhartendra Sharma .Helfer Skin Tap Technique For The Im Injection Pain Among Adult Patients. <https://doi.org/10.33698/NRF0236->
19. SYED AHMAD ZIA, Max Super Speciality Hospital; Nasogastric Versus Orogastic Route of Feeding in Preterm (<32 Weeks) Neonates; *ClinicalTrials.gov Identifier: NCT03073993*; March 8, 2017

20. Zeynep Erkut ,suzan Yildiz .The Effect of Swaddling on Pain, Vital Signs, and Crying Duration during Heel Lance in Newborns August 2017 Pain Management Nursing 18(5) DOI:10.1016/j.pmn.2017.05.007
21. Ashwani Kumar, Gursharan singh Narang et al. : Comparison of oral solution and topical anesthetics during immunization ;International Journal of Contemporary Pediatrics ,March 2019 ;DOI:10.18203/2349-3291.ijcp20191021
22. H.Bilgen et al . Comparison of sucrose, expressed breast milk, and breast-feeding on the neonatal response to heel prick ; The journal of Pain : October 2001, Pages 301-305.
23. Ali Imani ,Fatemeh Moradi , Comparison of the effects of oral sucrose 30% and 50% on the pain of injection of hepatitis B vaccine in newborns, Zahedan J. Res. Med. Sci. 2020; 22 (1): 1[e91557]-5 . <https://doi.org/10.5812/zjrms.91557>.
24. Zahra Amirkhanzadeh Barandouzi et al. Comparison of the analgesic effect of oral sucrose and/or music in preterm neonates: A double-blind randomized clinical trial Complement Ther Med. 2020 Jan.
25. Saiprasad Kavthekar, Rahul Patil, Anil Kurane, Hemant Bharati, Comparison of analgesic effect of 24% sucrose and breast milk in healthy infants less than 2 months of age ; International journal of contemporary pediatrics 2016 <https://dx.doi.org/10.18203/2349-3291.ijcp20163681>.