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# "A study to assess the effectiveness of oral glucose administration on reduction of pain response among infants during venepuncture in a selected hospital at Kannur".

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## Abstract

**Objective:** The Aim of this study is to assess the effectivess of oralglucose among the infants during venepuncture procedure.The findings of the study will help to reduce venepunctural pain in infants and practice in the clinical settings.

## 1. Introduction

Infants including newborn babies experience pain similarly and probably more intensely than older children and adults. Pain impulse transmission in infants occur primarily along non myelinated. Venepuncture is the recommended method for blood sampling in infants and is really a stressful event for children. Venepuncture in the paediatric population can be the most distressing event associated with medical encounters. An effective analgesic method that is easy to use during the venepuncture procedure also contributes to relieving the infant's distress. Non pharmacological procedures or technique to reduce procedure related pain and avoid potential drug's side effects are generally less expensive and can be performed independently by a nurse.Oral administration of sweet tasting fluid just before venepuncture may cause a calming or analgesic effect in infants.

Sucrose is the most widely studied non-pharmacological intervention for infant's pain management . Sucrose provides pain relief for newborn babies having painful events such as needles or heel pricks. The analgesic action of sucrose may involve descending pain modulating mechanism with inhibition of pain transmission at the spinal level. The presence of sucrose in the mouth also may stimulate the release of the endorphins from the hypothalamus.

Pain relief is achieved by reducing the total amount of noxious stimuli to which the infant is exposed and by blocking nociceptive transduction or transmission or activation of descending inhibitory pathways. Pain relief has been observed through many types of scales like the Neonatal Infant Pain Scale, Face, Legs, Activity, Cry and Consolability, Neonatal Facial Coding System and others.[9]

A study was conducted on the effect of sucrose on infants during a painful procedure to test the efficacy of treating the pain among infants associated with a medical procedure with sucrose with regard to overall physiological and behavioural stability.103 newborn infants were enrolled in this study. 2 ml of 5% sucrose solution was administered two minutes before a routine heel stick. The pain was assessed by measurements of physiological changes and behavioural changes [e.g. crying time, and the neonatal infant pain scale (NIPS) for neonates].Results showed that there were no differences among the groups with respect to physiological changes to pain but there were significant group differences in behavioural changes to the pain. Researchers have found that sucrose can be an effective method for the management of stress responses in infants with regard to behaviour. However, this treatment had no significant physiological effects.

## Objectives

1. To assess the pain response among infants of experimental group during venepuncture.
2. To assess the pain response among infants of control group during venepuncture.
3. To compare the pain response among infants of experimental group and control group during venepuncture.
4. To assess the association between the effectiveness of oral glucose administration in reduction of pain response with the selected demographic variables such as age, sex, Birth order and previous hospitalisation , presence of care giver, breast feeding the baby prior to venepuncture ,child response to previous venepuncture, distraction techniques used by parents during venepuncture.

**Hypothesis**

H1: There will be a significant difference in the level of pain among infants of experimental group and control group, during venepuncture.

$H_2$: There will be a significant association between the pain level among infants and selected demographic variables.

**11. Research Methodology**

The research designs adopted for the study was true experimental post-test only control group design. . The researcher assessed the groups to determine the effect of the treatment. The variables of the study include the independent variable is administration of oral glucose providing during venepuncture and pain response of the infant during venepuncture is the dependent variables.

**2.1 POPULATION AND SAMPLE**

In the present study population comprised of infants, between 1 month to 12 months of age undergoing the procedure of venepuncture and the sample consist of 60 children, 30 each in Experimental (Group I), and the

control group (Group II), aged 1-12 months who were undergoing venepuncture. The sample was selected using Simple Random Sampling technique and assigned to Group I & II.

**TOOL/INSTRUMENTS:**

The tools used for the data collection in this study were:

Tool 1: Demographic proforma (Appendices C )

Tool 2: Modified Neonatal Infant Pain Scale (Appendices C)

**Tool 1: Demographic proforma**

The demographic proforma consist of 8 items like age ,sex of the child ,birth order , child past experience to venepuncture , relationship of the child who is present during venepuncture , breast feeding the baby prior to venepuncture procedure ,distraction techniques used by parents during venepuncture.

**Tool 2: Modified Neonatal Infant Pain Scale**

This tool was used by the investigator to observe the infant's pain response during venepuncture. It included 7 parameters namely facial expression, cry, breathing pattern, movement of arms, movement of legs, state of arousal and activity.

The parameters were categorised according to the responses. The findings were observed and graded correspondingly. The maximum score was 9 and minimum was 0.

The scores were arbitrarily categorised as follows:

**Level of behavioural response to pain Overall score**

| | |
|---|---|
| 1- 3 | Mild discomfort |
| 4-6 | Moderate pain |
| 7-9 | Severe pain |

**Data collection process**

A formal written permission was secured from the administrator of the hospital, Nursing superintendent of the Raslock Hospital, Kannur.The final data collection was scheduled from14$^{th}$ February to 22$^{nd}$ March 2012.Lott-replace method was used for random assignment.60 chits labelled A and B(30+30) made for selecting sample when a child identified as per inclusion criteria,the chits shuffled in a box and a chit taken and the child allotted experimental or control group as per the label on the chit.The investigator and the subjects

were not aware about the group of the infant.The chit replaced in to the container to ensure equal opportunities' for each subject.

The parents were interviewed on the basis of demographic proforma. The infant along with the caregiver was taken to the treatment room. The investigator made the parent sit on the chair comfortably with the infant on the lap of parent. The infants in the Experimental Group I undergoing venepuncture were given intervention i.e oral glucose .Infants in the control group undergoing venepuncture without any intervention and only conventional standard practice maintained.

The pain levels of the subjects were observed by the investigator during the procedure. 1ml of 25% oral dextrose was provided just two minute before the procedure. The investigator observed and scored the infant's pain using Modified NIPS scale.

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**DATA ANALYSIS** :

By using descriptive and inferential statistical methods. The level of significance adopted was 0.05. Plan for data analyzes were as follows.

1. Distributions of samples according to baseline variables were explained using frequency and percentage.
2. Comparison of pain level among experimental and control group was analysed by using students't' test.
3. The association between pain and selected demographic variables were analysed using chisquare test.

**Distribution of the sample in experimental and control group according to the level of pain**

**( $n_1$=30)**

| Pain level | Range of Score | Experimental | | Control | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| Mild | 1-3 | 22 | 73.3 | - | - |
| Moderate | 4-6 | 8 | 26.7 | 2 | 6.7 |
| Severe | 7-9 | - | - | 28 | 93.3 |

Data presented in Table 4.1 shows that majority (73.3%) of infants in the experimental group demonstrated mild pain response whereas (26.7%) infants demonstrated moderate responses and no infants demonstrated severe pain response when oral glucose is administered prior to venepuncture Most of the infants(93.3%) in the control group demonstrated severe pain response and only 6.7% of infants demonstrated moderate pain response

**Table 4.2**

**Mean, median, SD and level of pain response to among children**

| Group | Mean | Median | SD | Max. score | Min. score | Level of Pain |
|---|---|---|---|---|---|---|
| Group I | 3.37 | 3.00 | 0.615 | 5 | 2 | mild pain |
| Group II | 7.90 | 11.00 | 0.662 | 9 | 6 | severe pain |

Data presented in the Table 4.2 shows that mean score of pain responses to pain of Group II (7.90±.662) was greater than that of GroupI (3.37±0.615).Overall pain response in Group I was mild and was severe in Group II.

**4.1 Section C: Effectiveness of oral glucose administration in reduction of pain response among infants during venepuncture.**

- Comparison of pain response of Group I and Group II.

To find the significant difference between the level of pain in the experimental and control group student 't' test was used .To compare the level of pain in Group I and II the following hypothesis was formulated.

H1: There will be a significant difference in the level of pain among infants of experimental group and control group, during venepuncture

**Table 4.3**

**Area-wise comparison of pain response to pain among infants in Group I and II**

| Sl.No | Parameters | Group I | | Group II | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| 1. | Facial expression | | | | |
| | 1.Relaxed | 1 | 3.3 | - | - |
| | 2.Grimace | 29 | 96.6 | 30 | 100 |
| 2. | Cry | | | | |
| | 1.No cry | - | - | - | - |
| | 2.whimper | 29 | 96.6 | 1 | 3.3 |
| | 3.vigorous crying | 1 | 3.3 | 29 | 96.6 |
| 3. | Breathing pattern | | | | |
| | 1.Relaxed | 29 | 96.6 | - | - |
| | 2.Change in breathing | 1 | 3.3 | 30 | 100 |
| 4. | Arms | | | | |
| | 1.Restrained | 26 | 86.7 | 7 | 23.3 |
| | 2.Relaxed | 1 | 3.3 | 0 | - |
| | 3.Flexed | 3 | 10 | 23 | 76.6 |
| 5. | Legs | | | | |
| | 1.Restrained | 27 | 90 | 10 | 33.3 |
| | 2.Relaxed | 1 | 3.3 | - | - |
| | 3.Flexed | 2 | 6.7 | 20 | 66.7 |
| 6. | State of arousal | - | - | - | - |
| | 1.Sleeping | 27 | 90 | 9 | 30 |
| | 2.Awake | 3 | 10 | 21 | 70 |
| | 3.Agitated | | | | |
| 7. | Activity | | | | |
| | 1.Lying quietly | 1 | 3.3 | - | - |
| | 2.Squirming | 27 | 90 | 1 | 3.3 |
| | 3.Jjerky | 2 | 6.7 | 29 | 96.7 |

Data presented in the Table 4.3 shows the various parameters used for pain assessment of infants: Face**:** Majority (96.6.3%) of infants in the Group I showed grimace and Group II (100%) had grimace.

Cry: Only (3.3%) of infants in Group I had vigorous crying , whereas majority of them were crying loudly in Group II ( 96.6%).

Breathing pattern: Most of the infants (96.6%) in Group I had no unusual breathing pattern whereas (100%) of infants in the Group II had change in breathing .

Arms **:** Majority (86.7%) of infants in Group I were restrained and (76.6%) of infants in the Group II **w**ere flexed.

Legs: 6.7% of infants flexed their legs in group I and 66.7% of infants in GroupII.

State of arousal **:**Only 10% of infants in the Group I were agitated and most of the infants (70% )Group II were agitated .

Activity: 90% of infants in group I were squirmed and 96.7% of infants showed rigid jerky movements in Group II.

**4.4 Section D: Association between pain and selected demographic variables**.

This section deals with findings of the association between the pain level scores and selected demographic variables. The mean pain scores obtained from both group were found to be 3.37 (Group I) and 7.9 (Group II). The number of subjects who were above mean and below mean were identified and grouped according to the demographic variables such as: age of the child, sex, birth order, previous hospitalization, relationship of the child with the care giver who is present during venepuncture, child's response to previous venepuncture, breast feeding the baby prior to venepuncture procedure, distraction techniques used by the parents during the venepuncture .

To test the association between pain level and selected demographic variables the following research hypothesis was formulated at 0.05 level of significance.

$H_2$: There will be a significant association between the pain level among infants and selected demographic variables.

**Comparison of pain response of Group I and Group II.**

**Table 4.4**

**Comparison of pain response score between Group I and Group II**

**($n_1$=30 $n_2$=30)**

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| Group | Mean | Standard Deviation | Standard Error(d) | df | 't' value |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Group I | 3.37 | .615 | .112 | 29 | 27* |
| Group II | 7.90 | .615 | .121 | | |

t (29)=2.045, P≤0.05, * significant

The data presented in the table 4.4 shows that there was significant difference in the pain response score of children between Group I and Group II t (29)=2.045, P≤0.05 suggesting that pain response to venepuncture was higher in Group II than Group I.

It proves that oral glucose is an effective method to reduce venepuncture pain among infants.

**Table 4.5**

**Chi-square test showing the association between pain scores and selected demographic variable**

| Slno | Variables | Pain scores Group I | Group II | X2 | df | Level of Significance |
|---|---|---|---|---|---|---|
| 1 | Age in month | | | | | |
| | 1-3 | 12 | 13 | 28.529 | 21 | * |
| | 4-6 | 4 | 8 | | | |
| | 7-9 | 8 | 8 | | | |
| | 10-12 | 6 | 1 | | | |
| 2. | Sex | | | | | |
| | Male | 16 | 18 | 18.743 | 7 | * |
| | Female | 14 | 12 | | | |
| 3 | Birth order of the child | | | | | |
| | First child | 21 | 18 | | | |
| | Second child | 8 | 10 | 7.754 | 14 | * |
| | Third child | 1 | 2 | | | |
| | Any other | 0 | - | | | |
| 4 | Previous hospitalisation | | | | | |
| | Yes | 17 | 26 | 18.33 | 7 | * |
| | No | 13 | 4 | | | |
| 5 | Relationship of child with the care giver | | | | | |

who is present during venepuncture

| | | | | | |
|---|---|---|---|---|---|
| Father | 3 | 3 | | | |
| Mother | 27 | 26 | 13.803 | 14 | * |
| Others | 0 | 1 | | | |

**Table 4.6**

**Chi-square test showing the association between pain scores and selected demographic variable**

| Slno | Variables | GroupI | Group II | X2 | df | Significance Level of |
|---|---|---|---|---|---|---|
| 6 | Breast feeding the baby prior to venepuncture | | | | | |
| | Yes | 1 | 7 | | | |
| | No | 29 | 23 | 9.5 | 7 | * |
| 7 | Child response to previous venepuncture | | | | | |
| | Calm and quite | 0 | - | | | |
| | Minimal resistance | 3 | - | 5.865 | 7 | * |
| | Rebellious and high resistance | 7 | 30 | | | |
| 8 | Distraction techniques used by parents | | | | | |
| | Yes | - | 2 | 4.304 | 7 | * |
| | No | 30 | 28 | | | |

1. Finding association between age in month and pain response

Calculated $\chi 2$ value 28.529, tabled value at 21df P <0.05% level of significance is 2.08. The calculated value is greater than the tabled value at 0.05% level of significance. So research hypothesis is accepted. It shows that there is a significant association between the age in month and pain response of the infants in the experimental group and control group (Table 4.5) .

2. . Association between sex and pain response

Calculated $\chi 2$ value18.743, tabled value at 7df P < 0.05% level of significance is 2.37. So research hypothesis is accepted . It shows that there is a significant association between the sex and pain scores at 0.05 level of significance (Table 4.5) .

3. Association between birth order of the child and pain response

Calculated $\chi 2$ value 7.754 tabled value at 7df P < 0.05% level of significance is 2.37. So research hypothesis is accepted. It shows that there is a significant association between birth order and pain response of the children in the experimental group and control group (Table 4.5) .

4. Association between previous hospitalization and pain scores

Calculated $\chi 2$ value 18.330 tabled values at 7df P < 0.05% level of significance is 2.37. So research hypothesis is accepted . There is a significant association between the previous hospitalization and pain scores of the children at 0.05 level of significance (Table 4.5) .

5. Association between relationship of the child with the care giver and pain scores

Calculated $\chi 2$ value 13.803, tabled value at 14 df P < 0.05% level of significance is2.15.So research hypothesis is accepted. Hence, there is a significant association between relationship of the child with the care giver and pain scores at 0.05 level of significance (Table 4.5) .

6. Association between breast feeding the baby prior to venepuncture and pain scores

Calculated $\chi 2$ value 9.5, tabled value at 7df P < 0.05% level of significance is 2.37. So research hypothesis is accepted . Hence there is a significant association between breast feeding the baby prior to venepuncture and pain scores at 0.05 level of significance (Table 4.6) .

7. Association between child's response to previous venepuncture and pain scores

Calculated $\chi 2$ value 5.865, tabled value at 7df, P < 0.05% level of significance is 2.37. So research hypothesis is accepted. Hence there is a significant association between child's response to previous venipuncture and pain response of infants at 0.05 level of significance (Table 4.6) .

8. Association between distraction techniques used by the parents during the venepuncture and pain scores

Calculated $\chi 2$ value is 4.304 , tabled value at 7df, P<0.05% level of significance is 2.37. So research hypothesis is accepted. Hence there is a significant association between distraction techniques used by the parents during the venepuncture and pain scores at 0.05 level of significance (Table 4.6)

## IV.RESULT AND DISCUSSION

In the present study 40% of the infants in experimental group (group I) were 1-3months of age and 43.3% of infants in the control group (group II) were 1-3 months of age. Among the sex distribution 53.3 % males were in experimental group and 60% males were in control group. And 46.7 % of females in experimental and 40% in control group. Majority of infants birth order in the experimental group (70%) and control group (60%) were first child. While considering the previous hospitalization majority of infants in the experimental (56.7%) and control group (86.7 %) had history of previous hospitalization. Majority of infant's mothers were present both in experimental (90 %) & control group (86.7%). 90% of infant's in the experimental and 100% of infants in the control group showed rebellious and high resistance to previous venepuncture. Majority of infants in the experimental group (96.7 %) & control group (76.7%) were not breast feded prior to venepuncture. Comparison of pain in two groups showed that in group II the mean pain response were higher than group I (7.90 ±.662 V/S 3.37±0.615).The calculated value of't' test ($t_{65}$=2.045,P <0.05) indicated that the group II had significantly higher pain response than that group I this shows that oral glucose was effective in altering the pain response of infant during venepuncture .

**Conclusion**

From this study it was conclude that 1ml of 25% dextrose (oral) was an effective pain therapy for venepuncture in infants and mitigated the behavioural responses to pain.

It is also a safe and cheapest method for reducing the procedural pain responses.

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