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Effectiveness of Oral Administration of 10% Dextrose on Level of Pain During Venipuncture in Neonates in Western India: A Pilot Study

Madhu Jeengar[1]*, Vijay Singh Rawat[2]

[1]Ph.D. Scholar, Sai Tirupati University, Udaipur, Rajasthan, India
[2]Professor Cum Principal, Sai Tirupati University, Udaipur, Rajasthan, India
*Corresponding Author: Madhu Jeengar

ABSTRACT

Introduction: Infants are unable to verbalize pain and that is why it might go unnoticed. In the past, It was believed that neonates did not feel pain or that a painful experience would be forgotten as rapidly it has occurred. The present study was conducted with aim to evaluate effectiveness of oral administration of 10% dextrose on level of pain during venipuncture in neonates. **Methodology**: The present research was done using quantitative approach and quasi-experimental research design The study was conducted among 20 neonates (10 experimental and control) were selected by using non probability convenience sampling method. The samples were comprised of neonates who were admitted in NICU, MG Hospital, Bhilwara. for treatment as well as for observation. **Results**: The findings revealed that 10% dextrose consistently demonstrates a significant effect on decline the pain level among the neonates analgesic effect for venipuncture and similar minor invasive procedures, direct evidence specifically for IV cannulation at this strength is often extrapolated from venipuncture studies. The efficacy of 10% dextrose for procedural pain is mixed, and 5% dextrose is generally not considered effective for analgesia. **Conclusion**: While generally safe for oral administration, the review emphasizes the need for more specific research on dextrose's role in IV cannulation pain, distinct from venipuncture, and consistent use of higher effective concentrations.

KEYWORDS: *Efficacy, Dextrose 10%, Pain Level, Venipunture, Neonates*

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INTRODUCTION

Advancements in medical technology and nursing care have enhanced the survival rates for both preterm and term infants. The neonatal intensive care unit (NICU) is a specialized facility where healthcare professionals provide care for high-risk newborns, including those born prematurely, with low birth weight, and those experiencing additional health issues. Care delivered in neonatal intensive care units has significantly reduced mortality and morbidity rates among high-risk infants.[1-2] Newborns can experience up to four hundred painful procedures throughout their time in neonatal intensive care units. A significant number of them face painful interventions like heel pricks, cannulation, and endotracheal intubation on a daily basis. Children have indicated that the discomfort from procedures, especially during the placement of intravenous cannulas, is the most common challenge they encounter. Nurses play a valuable role in minimizing the physical discomfort and the related complications. Peripheral intravenous cannulation is associated with a number of both physical and physiological complications.[3] Nurses have an important role in reducing physical discomfort and related complications. Peripheral intravenous cannulation has several potential physical and physiological complications. Infants cannot express pain verbally, which can cause it to go undetected. In the past, it

was thought that neonates did not experience pain or that any painful incident would be quickly forgotten. However, recent evidence indicates that not only do infants experience pain, but they actually perceive it more intensely than adults.[4]

A research by the University of Oxford, alongside Sezgi Goksan, showed that many areas of the brain associated with pain in adults are also activated in healthy full-term infants. Additionally, it was observed that the FMRI responses in infants occur at lower sensory thresholds compared to adults. This finding indicates that newborns have a heightened sensitivity to pain. A survey conducted in the United Kingdom revealed that 25% of neonatal units do not have established pain management guidelines for standard painful procedures. While nurses commonly apply comfort techniques, they seldom recognize these as non-pharmacological interventions and provide minimal documentation of the pain experiences in neonates and the methods used to address it.[5-6] The present study was conducted with aim to evaluate effectiveness of oral administration of 10% dextrose on level of pain during venipuncture in neonates.

Research Methodology:

In the present study, Quantitative approach and quasi experimental research design were selected. The study was conducted among 20 neonates (10 experimental and control) were selected by using non probability convenience sampling method. The samples were comprised of neonates who were admitted in NICU, MG Hospital, Bhilwara. for treatment as well as for observation. The data collection was done by demographic and Modified COVERS neonatal pain scale. In the study, 10% dextrose was applied at the time of venipunture among the neonates. The variables like SPO_2, heart rate, pain and cry duration were assessed after venipunture.

Inclusion Criteria:

- Full term neonates.
- Neonate attendant who are willingly to participate in the study.
- Neonate who admits in selected hospital at the time of data collection.

Exclusion criteria:

- Neonates with any birth defects.
- Premature and post mature neonates.
- Neonate with hypothermia and hyperthermia.
- Neonates with severe respiratory disorders.

Method of data collection

A formal written permission was obtained from the concerned authority to conduct the study. Neonates were identified as per the inclusion criteria. Subjects were selected using convenient sampling method and assigned to the experimental group and the control group. The details of the study and the need for the study were explained to parents and a written consent was obtained. The information collected as per the demographic performa. The pain was assessed by Modified COVERS Neonatal Pain Scale before and after the procedure. In experimental group 2 ml of 10% of Dextrose given orally 2 minutes before the procedure, and pain assessment was done. In the control group, observation of pain was made for 30 neonates, where no intervention was given. The time duration for the pain assessment was 1 minute before procedure and 2 minutes after procedure.

Results:

Table no. 1 Frequency and Percentage Distribution Of Subjects according to Demographic Data. N=20

S. No	Variables	Characteristics	Control Group		Experimental Group		Total
			n	%	n	%	
1	**Age in days**	1-10 days	06	60	07	70	13
		11-20 days	03	30	2	20	05
		>20 days	01	10	01	10	02
2	**Medical Diagnosis**	Hyperbilirubinemia	6	60	05	50	11
		Birth asphyxia	01	10	02	20	03
		Neonatal sepsis	01	10	02	20	03
		Other	02	20	01	10	03
3	**Gender**	Male	04	40	6	60	10
		Female	06	60	4	40	10
4	**Time gap between last feed & procedure**	Within half an hour	0	0	0	0	00
		30minutes-1 hour	0	0	0	0	00
		1- 2 hour	02	20	1	10	03
		> 2 hours	08	80	9	90	17

5	**Mode of birth**	Normal vaginal delivery	03	30	6	60	09
		Caesarean section	7	70	4	40	11
		Instrumental delivery	0	0	0	0	00
6	**Any congenital Abnormalities**	Yes	0	0	0	0	00
		No	10	100	10	100	20

Table-1 revealed the socio-demographic profile of the neonates. In terms of age, majority of the neonates (65%) were between 1-10 days followed by 40% neonates were between 11-20 days. In terms of diagnosis, majority of the neonates (55%) were having Hyperbilirubinemia. In terms of gender, 50% neonates were male and 50% were female. As per time gap between last feed and procedure, majority of the neonates (85%) have more than 2 hours. As per mode of birth, majority of the neonates (55%) were cesarean delivery followed 45% neonates delivered by normal vaginal delivery. No neonate was having any congenital abnormalities.

Table 2: Comparison of mean pain scores of neonates in experimental and control group. N= 20

Test	Group	Mean ± SD	t-value	p-value
Pretest	Experimental (n=10)	0.62±0.37	0.526	0.605
	Control (n=10)	0.67±0.43		
Posttest	Experimental (n=10)	1.38±0.81	3.016	0.007
	Control (n=10)	2.23±0.93		

The table-2 highlighted comparison of mean scores in experimental and control group. In the pretest, mean pain score in experimental group was 0.62±0.37 while in control group it was 0.67±0.43. The pretest findings revealed that there was a no significant difference (p-value= 0.605) in both groups (Figure-1). After the intervention, mean pain score in experimental group was 1.38±0.81 while in control group it was 2.23±0.93. The findings revealed that there was a significant difference (p-value= 0.007) in both groups in terms of pain scores after venipunture among the neonates.

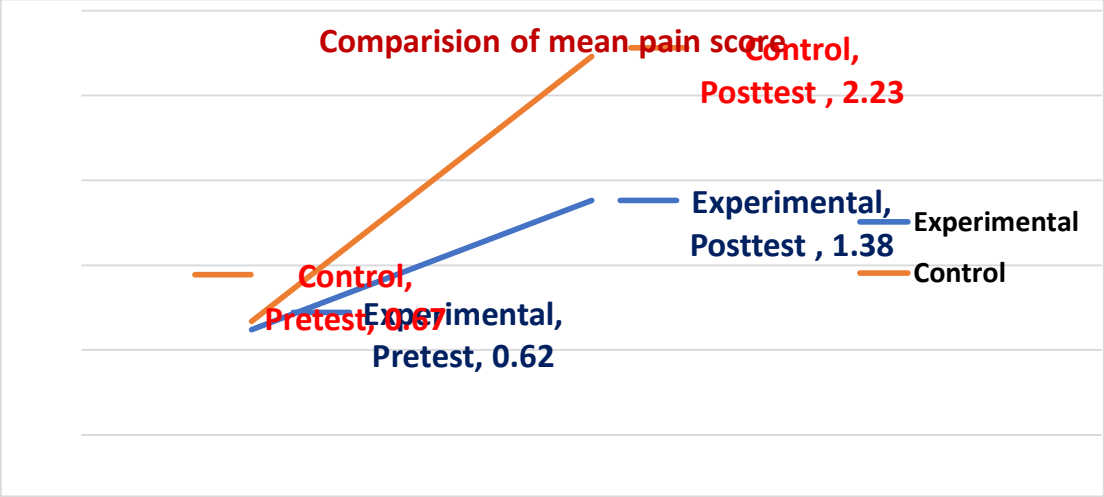

Figure-1: Comparison of pain level in experimental and control group.

Discussion

The present study highlighted that in the pretest, mean pain score in experimental group was 0.62±0.37 while in control group it was 0.67±0.43. The pretest findings revealed that there was a no significant difference (p-value= 0.605) in both groups. In context to our research, **Amitabh et al** stated that the mean pain score of the experimental group and control group was not significant. The current research also communicated that after the intervention, mean pain score in experimental group was 1.38±0.81 while in control group it was 2.23±0.93. The posttest findings revealed that there was a significant difference (p-value= 0.007) in both groups. A study by **Brinda P et al (2025)** explored that mean pain score of group-I and group-II were 3.73 ±1.55 and 2.67±0.96 indicating that pain experienced by neonates in group-II was significantly lower (p-value= 0.014). This finding was in support of our research. In context to our research, **Amitabh et al** stated that the mean posttest pain score of the experimental group and control group was significant (p <0.001). Similar study by **Barati L et al** communicated that glucose solution was effective (p<0.05) in reducing pain response during the procedure. The present study was supported by the findings. Another study by **Nimbalkar S et al** showed that the mean pain score was statistically significantly lower in the intervention

group when compared to the control group ($p < 0.001$). The oral 10% dextrose is an effective analgesic for relieving pain during the painful procedure**.** The findings of the present study showed that there is no significant association between pain score of neonates in the experimental and the control group with the selected demographic variables like age in days, sex, time gap between last feed and procedure, mode of birth, diagnosis.

Conclusion

The study concluded that 10% of oral dextrose is effective in reducing level of pain during venipuncture in neonates. Non-pharmacological management is an effective means for reduction of procedural pain in neonates. It can also be used as a routine with standard care so that neonate's behavioural responses can be managed in an effective way. Nurses can facilitate the comfort of their patients by using the neonatal pain management techniques. It also makes a positive contribution to the neonates' emotional and physical well-being. There is a need of using non-pharmacological methods in pain reduction during venipuncture among neonates.

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Conflict of interest: Nil

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