

## ORIGINAL ARTICLE

NEONATAL PAIN AND PREVENTIVE STRATEGIES: AN EXPERIENCE  
IN A TERTIARY CARE UNIT

Shahid Mahmud, Sajid Ali Shah\*, Saeed Zaman Khattak\*

Department of Paediatrics, CMH Medical College/ CMH Lahore, \*CMH Quetta-Pakistan

**Background:** Little is known about neonatal pain in Pakistan. So, to know about neonatal pain, its scoring and the effectiveness of oral dextrose in neonatal pain management we carried this study in neonatal intensive care unit (NICU) of military hospital (MH) Rawalpindi. **Methods:** This randomized control trial was carried out in NICU of MH, Rawalpindi from Jan to Dec 2013. Total of 252 babies were enrolled in the study. We assessed neonatal pain by using Modified Behavioural Pain Scale (MBPS). Babies were given 10% dextrose and sterile water two minutes before a painful procedure and pain assessment was done after the procedure. The different painful procedures included, heel prick, nasogastric (NG) tube insertion, cannulation, catheterization and venepuncture for blood sampling. **Results:** A total of 252 babies were enrolled in the study. Of these 139 (55%) were male and 113 (45%) were female babies. Painful procedures included heel lancing 120 (48%), I/V cannulations 60 (24%), venepuncture 40 (16%), NG insertion 26 (10%) and Foley catheterization 6 (2%). Mean MBPS score with 10% dextrose and sterile water were 4.31 and 6.26 respectively and the difference between two was significant statically. **Conclusion:** Oral dextrose is a cheap and easily available solution and can be used in neonatal pain management during various painful procedures.

**Keywords:** Pain; Neonate; Dextrose solution; Venepuncture; Nasogastric tube

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## INTRODUCTION

Pain is subjective phenomenon and is defined as an unpleasant sensory and emotional response produced by potential or actual tissue damage<sup>1</sup>. In NICU neonatal pain is still underestimated, as new-born babies can't verbalize their pain. Neonates admitted in NICU may undergo 10-15 painful procedures daily and in most of the cases no pain relief is considered. If pain in neonates is not properly managed it may have a lot of short and long term adverse effects including emotional, behavioural and learning disabilities.<sup>2,3</sup>

Several scales have been devised for neonatal pain assessment. These take into account neonatal behavioural and autonomic responses like facial expression, variation in heart rate, body movements, oxygen consumption and duration of cry.<sup>4,5</sup> Various painful procedures, a neonate might undergo during stay in NICU include heel prick for cap gases, venepuncture, NG tube insertion, catheterization and intubation etc.<sup>6</sup>

During painful procedures in NICU various pharmacological and non-pharmacological measures are used for pain management in neonates. The various non-pharmacological measures for pain relief in neonates include Kangaroo skin care, tactile soothing and oral dextrose solution in different strength. The pharmacological measures include paracetamol and opioids boluses or infusions.<sup>7,8</sup> The use of muscle relaxant and sedative may mask babies' response to painful stimuli and does not provide pain relief.

## MATERIAL AND METHODS

This study was carried out in NICU of MH, Rawalpindi. The study period extended from January to December 2013. All the full-term babies undergoing painful procedures like heel prick, NG tube insertion, catheterization and venepuncture were included in the study, except those on ventilator or those who were getting sedatives or muscle relaxant as these babies make pain scoring difficult. The neonates were divided into two groups randomly, one to be given sterile water and the other 10% dextrose. We used 10% dextrose oral solution and sterile water 2 minutes prior to the procedure and assessed pain after the procedure. Pain was assessed using MBPS. Pain score in this scale ranges from 0 to 10.

## RESULTS

Total no of children in our study were 252. Out of these 139 (55%) were males and the rest 113 (45%) were females. The frequency of different type of pain procedures included, heel lancing was done in 120 (48%) children, intravenous cannulation was done in 60 (24%) children, 40 (16%) children underwent venepuncture, nasogastric tube insertion was done in 26 (10%) patients and the in the rest 6 (2%) children the painful procedure was foley's catheterization.

SPSS version 20 was used for statistical analysis. The mean Baseline MBPS pain score which was measured before the painful procedure was 3.18±0.519. The children undergoing different painful procedures were given 10% dextrose 2

minutes prior to the procedure. The mean score after the painful procedure was  $4.99 \pm 0.805$  and  $6.89 \pm 0.822$  in 10% dextrose and sterile water groups respectively. The comparison of mean MBPS scores between the 10% dextrose and placebo groups is given in table-2 which was significant and was calculated by using independent sample *t* test SPSS.

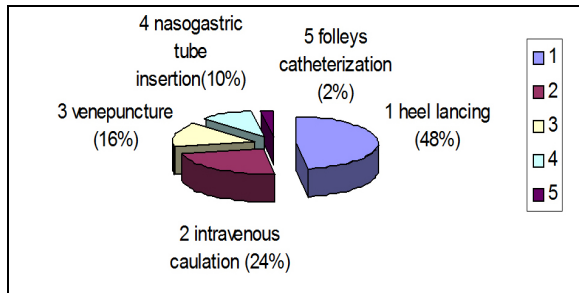


Figure-1: Frequencies of different painful procedures

Table-1: Modified behavioural pain scale

Parameters	Findings	Points
Facial Expression	Definite positive expression (smiling)	0
	Neutral expression	1
	Slightly negative expression (grimace)	2
Cry	Definite negative expression (furrowed brow eyes closed tightly)	3
	Laughing or giggling	0
	Not crying	1
Movements	Moaning quiet vocalizing gentle or whimpering cry	2
	Full lung cry or sobbing	3
	Full lung cry more than baseline	4
	Usual movements and activity	0
Rigidity	Resting and relaxed	0
	Partial movement (squirming arching limb tensing clenching)	2
	Attempt to avoid pain by withdrawing the limb where puncture is done	2
	Agitation with complex/generalized movements involving the head torso or other limb	3
	Rigidity	3

Table-2: Comparison of mean MBPS scores of 10% dextrose and placebo groups

Parameter	10% dextrose group (n=126) mean±SD	Sterile water group (n=126) Mean±SD	<i>p</i> -value
MBPS score after painful procedure	$4.99 \pm 0.805$	$6.89 \pm 0.822$	<0.001

*p*-value calculated using independent sample *t*-test.

## DISCUSSION

Neonates are exposed to a number of painful procedures in NICU. A no of studies has been carried out to assess pain in neonates in different painful procedures. In a systemic review of 38 studies, heel lancing was performed in 21 studies and in 11 studies venepuncture was performed<sup>4</sup>. Another review showed that the different painful procedures, neonates undergo during NICU admission include 49% heel lancet, 14% intra muscular injections and 14% venepunctures.<sup>9</sup> In our study too the most painful procedure was heel lancing followed by cannulation, NG insertion, and blood sampling and catheterization.

There are a number of pain scales for neonatal pain assessment and in different studies different scales have been used. In term and pre-term babies the most widely used behavioural indicators are cry, motor activity and facial expression. Although infant pain expression can be influenced by a no of factors like severity of illness, physical and neurological impairment, behavioural indicators are still considered the most valid indicator of pain for term and pre-term babies.<sup>10</sup> In our study, we used MBPS which is a combination of these behavioural responses. This pain scale was devised by Taddio *et al* and has been used in multiple studies for neonatal pain assessment.<sup>11</sup>

A number of non-pharmacological measures are used for pain management in neonates like sucrose and glucose solutions in different concentration<sup>9</sup> and extracted breast milk<sup>12</sup> etc. The role of each has been established in different studies. There are many studies, which have established the role of oral glucose in neonatal pain relief during painful procedures as compared to placebo. In a systemic review, significant pain reduction was observed during venepuncture and heel lancing with oral glucose solution<sup>4</sup>. Study by Dilen B *et al* showed 10% dextrose to be effective in reducing neonatal pain during venepuncture but was less effective than higher concentration of dextrose.<sup>13</sup> In one study, it was found that breast milk and 10% dextrose solution has no analgesic effect during heel prick in neonates.<sup>14</sup> Study from India reported that 10% dextrose and EBM were equally effective in reducing pain during heel prick but were less effective than 25% and 50% dextrose.<sup>15</sup> In our study, to 10% dextrose was found to be effective in reducing pain in different painful procedures. One study reported a better pain response with dextrose plus pacifier than with dextrose alone.<sup>16</sup>

We used MBPS scale in our study for pain assessment. This scale scores from 0 to 10. This pain score was first used by Taddio *et al* in 1995.<sup>11</sup>

Abuelkheir *et al*<sup>17</sup> also used this score in their study. They had 216 children in their study, but they used Eutectic mixture of local anaesthetics (EMLA) for pain relief. The mean baseline score in their study was  $3.36 \pm 1.88$  and the mean mbps score in the EMLA group after the painful procedure was  $5.92 \pm 2.17$  and  $7.32 \pm 1.73$ . While the total no of children in our study were 252 and the mean base line score before painful procedure was  $3.18 \pm 0.519$  and the mean score after painful procedure was  $4.99 \pm 0.805$  with 10% dextrose and  $6.89 \pm 0.822$  in the placebo group. The mean difference between pre and post procedure pain scale in their studies were 2.56. While the mean difference in our study with 10% dextrose was 1.8 which is comparable to their studies.

Conclusion: neonatal pain should be given due consideration and to prevent any acute and chronic consequences of neonatal pain, it should be managed promptly. 10% dextrose is easily available and a cheap solution and it can be used for pain management in NICU during different painful procedures.

#### AUTHORS' CONTRIBUTION

SM: Study design & concept, data collection, writing, literature search & statistics. SAS: Literature search, writing, discussion, and statistics. SZK: Literature search, references & references.

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#### Address for Correspondence:

Dr Shahid Mahmud, Department of Paediatrics, CMH Medical College/ CMH Lahore-Pakistan

Cell: +92 331 530 1289

Email: shahidmahmud101@hotmail.com