ROLE OF SUCROSE AND BREAST FEEDING FOR ANALGESIA IN NEWBORN INFANT UNDERGOING PAINFUL PROCEDURE
A COMPARATIVE STUDY

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1. INTRODUCTION
Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. It is the basic right of every individual, irrespective of age or size to have alleviation of pain. Pain in newborn is an ubiquitous phenomenon. All newborns will experience iatrogenic pain in the first days of life, commencing with vitamin–k injection, sampling and metabolic screening. Pain may worsen already compromised physiological states like hypoxia, hypercarbia, acidosis, hyperglycemia or respiratory distress. Since neonates cannot verbalize pain, the recognition and management of pain in newborn babies is still suboptimal in NICU. Neonates do feel pain, and analgesia should be prescribed when indicated during medical care. Fetus is capable of mounting a stress response as early as 23 wks of gestation. Immature nervous system of preterm infant can’t discriminate noxious and non-noxious stimuli react similarly to a variety of stimuli lack the ability to modulate pain response, doesn’t consistently manifest sign and symptoms. Infant cannot verbally report their level of pain. As per previous study neonatal response to painful stimuli were decorticate in nature and perception, memories of pain was not present. Higher threshold of painful stimuli protects infant from pain following birth process. Relation between feeling pain and reporting pain are highly context dependent. Pain can be physiological, neuropathic, visceral and inflammatory or it may be like acute, established and chronic. Modification of pain system occurs in repetitive or prolonged pain due to altered processing in spinal and supra spinal region. Repeated painful stimulus increases the response of pain in future causing hyperalgesia and allodynia. To reduce the pain during procedure behavioral approach, non-pharmacological approach, pharmacological approach are the modalities. Manifestation of pain is detected by physiological, biochemical and behavioral changes. There are various tools to measure pain in neonate like NFCS (uni-dimensional), PIPP (acute pain), N-PASS (prolonged pain), NIPS (neonatal infant pain score), CRIES (cry require oxygen, increase vital sign, expression, sleeplessness). COMFORT scale.

2. MATERIALS AND METHODS
This hospital based study was conducted during a period of one year from December 2013 to December 2014, in NICU of Hi-tech Medical College & Hospital, study group constitute Term and preterm neonate after 32 weeks of gestation to 28 days after delivery admitted to NICU of Hi-Tech medical college. 150 neonate were taken out of which 66 were preterm and 84 were term. Effectiveness of sucrose and breast feeding were assessed during arterial /venous sampling procedures after taking consent from the parents and clearance from ethical committee.
Aim is to providing routine assessments measure like behaviour, physiological ,CRIES (cry, requires oxygen, increased vital sign ,expression , sleeplessness ) to detect neonatal pain and to assess the effectiveness of sucrose and breast feeding for the new born infant undergoing painful procedure like arterial / venous sampling. Sucrose administer through 2ml sterile syringe and dropper, desired dose were taken, tip of syringe /dropper was placed into the side of infants mouth onto anterior portion of tongue and solution was dispensed slowly. Baby was allowed to savour the sweetness. Breast milk was given directly or by katori –spoon either during or just before the procedure.
Vital parameters, facial expression and oxygen saturation were taken during and after the procedure. All new born delivered after 32 weeks of gestation admitted to NICU of HMCH wee included in my study. New-born having neonatal encephalopathy, Severely ill child, Baby having external congenital anomaly, IUGR child ,Infants with feeding intolerance and without bowel sound,Infants with esophageal atresia or trachea-esophageal fistula,Parents denied to give any consent were excluded from my study.
The sample size was determined by using the formula \[ \frac{4pq}{P} \]
Where,
P= Prevalence, Q= 100-P, L= Allowable errors = 10% of P.
Data was entered and analyzed using SPSS 16.0 software.

RESULTS AND OBSERVATIONS:-
Among 150 newborns 44% (66) were preterm and 56% (84) were term

Fig-1.1 In this study term newborn outnumbered the preterm.

Breast feeding is equally effective as sucrose. Direct breast feeding gives both immotional component and analgesic effect rather than katorispoon feeding of expressed breast milk.

Fig-1.2 Analgesic effect of sucrose and breast feeding

Fig-1.3 Analgesic effect of sucrose and breast feeding in preterm and term newborn
70% preterm responds to breast feeding whereas 74% responds to oral sucrose. Among term newborn 61% responds to breast feeding and 66% responds to oral sucrose.
Fig-1.4 Effect of analgesia in preterm infant
42% preterm responds to direct breast feeding during procedure, 30% not responded to breast milk at all either by direct or by katori-spoon.28% respond to expressed breast milk with katorispoon. When the baby is in mothers lap there was extra beneficial analgesic effect comparing with expressed milk. It is a natural phenomenon when baby is busy on feeding, which causes some neuro-hormonal secretion causing better analgesic coverage.

Fig-1.5 Effect of analgesia in term infants
41% term newborn responds to direct breast feeding, 39% not responds to breast feeding.20% responds to expressed breast milk through katori-spoon. This ration is approximately same as preterm.

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<tr>
<th>PARAMETERS</th>
<th>ARTERIAL/VENOUS SAMPLING</th>
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<tr>
<td>NO CRY</td>
<td>59%</td>
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<tr>
<td>RR NORMAL/SLIGHTLY INCR.</td>
<td>69%</td>
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<tr>
<td>NO CHANGE IN FACIAL EXPRESSION</td>
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<td>HR NORMAL/SLIGHTLY INCR.</td>
<td>67%</td>
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<tr>
<td>O2 DEMAND NORMAL</td>
<td>69%</td>
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<tr>
<td>SLEPLESSNESS</td>
<td>61%</td>
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<tr>
<td>ACTIVITY</td>
<td>60%</td>
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Table-1.1 Parameter during procedure under breast feeding.
Cry is the most prominent marker of pain. It requires nearly minimal skill to assess the pain following a procedure when the child cries. 59% of babies did not cry during breastfeeding. During any procedure there are some changes in vital parameters and O2 demand. When procedures are done under breastfeeding, nearly 67-69% there is minimal change/no change in vital parameter. Facial expression like brow bulge, eye squeeze, nasolabial furrowing, mouth or lip purse, tongue tautness occurs following a painful procedure. 66% of babies responded well to breastfeeding with no change in facial expression during procedure.

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<tr>
<td>NO CRY</td>
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<tr>
<td>RR</td>
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<td>ACTIVITY</td>
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Table-1.2 Changing parameter with oral sucrose

Oral sucrose in my study has slightly better control of analgesia than breastfeeding though it has some adverse effect on pre-term. 69% babies had no cry during procedure under the analgesic effect of sucrose. Vital parameters like HR and RR had minimal changes with sucrose during procedure. Oxygen demand and activity has responded well when child is on oral sucrose. Oral sucrose has better analgesic coverage than breastfeeding in my studies.

Fig-1.6 Changing parameters with breast feeding and oral sucrose
DISCUSSION:

Neuroanatomical components and neuroendocrine systems are sufficiently developed to allow transmission of painful stimuli in the neonate. If a procedure is painful in adult then it should be painful in neonates, but the only difference is adult can express it verbally while a neonate cannot. Proper management of pain in new-born may be associate with decrease clinical complications, morbidity and mortality. A lack of behavioural response during procedure in new-born does not necessarily indicate lack of pain. Response to pain in infants is not simply as an immature adult but it has more structural and functional connectivity with CNS. Neonatal sufferings through pain can be reducing by either reducing the procedure with proper planning or proper use of analgesic measures.

All neonatal units should have a neonatal pain control program which emphasizes on providing routine assessments to detect neonatal pain, reducing the number of painful procedure, preventing or treating acute pain following procedure. Short term procedures which causes pain are IV or IM access, lumbar puncture, adhesive tape removal, suturing, arterial or venous sampling, suctioning, OG/NG tube insertion, immunization, urinary catheterization.

Breast feeding has been found to be almost as effective as sucrose when used as an analgesic coverage in various procedures. Breast milk being a natural product is economically accessible to all stratas of society, easily absorbable in the gut and have no proven risk associations. Preterms often show refusal to feed on repeated use. Hence alternatives may be used better analgesic coverage. Sucrose has a longer analgesic coverage as compared to breast milk, though repeated use of sucrose has been related to slightly increased risk of NEC in few ongoing trials. Preterm were better responded to both sucrose and breast feeding than term. Cochrane review (Stevens et al, 2004) supports use of oral sucrose for procedural analgesia.


Non-nutritivesucking (NNS) both withand without sucrose, breast milk, breastfeeding, swaddling or facilitated tucking, Kangaroo care, Music therapy, and multi-sensorial stimulation. Maternal touch, ‘NNS’ and ‘Kangaroo care’, may elicite activation of neuro-peptidessy stems such as cholecystokinin (CCK).Breastfeeding is better than sucrose solutions for procedural pain in term neonates. The role of breastfeeding or supplemental breast milk in cases of repeated painful procedures has not been established. The effect of sucrose on pain is mediated via its gustatory effect (taste).Doses are given onto the tongue, not via a gastric tube 2 minutes prior to the painful procedure. Dose for preterm (32 to 36 wks) - 0.5 to 1 ml Term neonate-1 to 2 ml. The calming effect of sucrose is not dependent on volume of sucrose but it depends due to sweet receptor mediated neural regulation.Breastfeeding or oral sucrose is effective for short duration procedures.

Despite of complex behavioral, physiologic, biochemical response of neonates and the short and long term clinical outcomes of pain the control measures of neonatal pain are still sub optimal. Prevention of pain should be the goal of all caregiver associated with newborn. Every health care facility dealing with neonates should have a written pain prevention policy which include regular pain assessment, reduction of painful procedures, use of non-pharmacological methods may be helpful. Treatment of pain should include behavioral, pharmacological, environmental intervention. The surrounding environment of newborn should be conducive for the wellbeing of neonate. Knowledge and validation of competency in pain assessment and management for all neonatal units should be a professional responsibility.

CONCLUSION

Breast milk should be the preferred analgesia for both preterms and terms undergoing short duration procedure. Sucrose should be used in situations where breast milk fails to maintain analgesia, refusal to feed.. Mothers milk is safer than sucrose .Breast feeding is cost effective and safe method in reducing pain still then we have to use other analgesia for better coverage and good outcome. Reducing the number of painful procedures by proper planning will prevent over use of any analgesia. There should be a proper guideline to be available in each NICU set up for prevention and management of pain. Environmental and behavioral approaches along with non pharmacological intervention should be priorities before any pharmacological management.
REFERENCES

3. CLOHERTY, paediatrics res 2010, durrmeyer