



A study to assess the effectiveness of breast feeding on pain perception during vaccination among infants at urban health centre, Vijayawada

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ABSTRACT— *The present study was conducted to assess the effectiveness of breast feeding on pain perception during vaccination among infants. A True experimental, post test control group design was adopted with a total number of 200 subjects (100 Experimental group + 100 control group infants) from urban health centre by 'simple random sampling' method, Vijayawada. The tools used for conducting the study were a set of demographic variable, modified behavioral pain scale and visual analog scale. Infants nursed just before (5 min), during and after vaccination for the experimental group and Infants of control group placed in the mothers hands without being breast feed and collected pain score and crying duration. Data were analyzed with the help of descriptive and inferential statistics. The present study which clearly shows that there was a significant reduction in the pain perception during vaccination among infants of experimental group with 't' value 10.7482 for modified behavioral pain scale and 12.9932 as per VAS at 0.01 level of significance, which emphasizes that breast feeding can be used as an effective pain relieving measure during vaccination*

Keywords: Effectiveness of breastfeeding, Pain perception, Vaccination, Infants

I. INTRODUCTION

Infancy is a time to gurgle, a time to crawl, and time for laugh and cry a time to hear a sweet lullaby at it is a time to get vaccinated against major killer diseases. India is a vast country with widely differing populations. The all India rate masks variations that exist among sub groups of the population. Among sub groups infants are most important age group in the society, because there is renewed awareness that the determinants of infectious and chronic diseases in later life are laid down at this stage. The main causes for infants mortality are under weight, communicable diseases i.e, by immunization and oral rehydration.¹

One way of controlling infectious diseases by strengthening the host defense by active immunization, which is one of the most power full and effective weapon of modern medicine. Routine immunization is a cornerstone of public health, believed to save an estimated 2-3 million lives annually.²

Immunization is a process of protecting an individual from a disease through the introduction of live, killed or attenuated organisms in the individual system.³The advent of combination vaccines significantly reduced the volume of immunization activities by decreasing the number of injections, amount of pain and cumulative exposure to preservatives and stabilizers that may contribute to adverse events. Pentavalent vaccines (a combination vaccine which protects against five killer diseases: diphtheria, pertussis, tetanus, hepatitis B and Hib). The pentavalent vaccines provide a golden opportunity to curb Hib disease and hepatitis B along with diphtheria, pertussis and tetanus in the developing countries.^{4,5}

Children continue to be subjected to pain and distress during immunization, despite recent advances in the assessment and management of acute pediatric pain. Reports from children,

parents and nurses consistently indicate that many children do indeed fear the "shot". This finding is also supported by research indicating that a minority of the adult population also suffer from fear involving needles.⁶

The myth regarding neonatal pain suggests that because of neurological immaturity, neonates do not experience pain. Studies have shown that pain pathways as well as cortical and sub cortical centers, necessary for pain perception are well developed late in gestation and physiological and behavioral responses to pain are well documented in neonates.⁷ In addition to pain and distress, lack of pain control for injection is a barrier to immunization. Many physicians withhold scheduled vaccines out of concern for the excessive pain for simultaneous immunization. The pain associated with immunization is a source of anxiety and distress for the children receiving immunizations, their parents and the providers who must administer them.⁸

Pain management strategies are available to reduce immunization injections pain .they are physical interventions, psychological interventions, and pharmacological interventions.(e.g.; EMLA cream , analgesics etc) . The university of Michigan researchers simply had parent distract and engage their infants with sucking, rubbing, getting them looked at interesting object, singing, and breast feeding, parental contact while the staff person got the shot ready.⁹ Health care professionals should anticipate predictable painful experiences and monitor the condition of patients accordingly. To treat pain adequately, ongoing assessment of the presence and severity of pain and the child's response to treatment is essential. Reliable, valid, and clinically sensitive assessment tools are available for neonates through adolescents. Pain can be assessed using self-report, behavioral observation, or physiologic measures, depending on the age of the child and

his or her communication capabilities. Specific measures vary in their validity and usefulness.¹⁰

Breast feeding is more than nourishing infants with mother’s milk ,it provides comfort as well as serves as a pacifier for non –pharmacological pain relieving during painful procedures .¹¹ Breast feeding is effective as that observed in 30 percent glucose plus sucking pacifier. Breast feeding is effective due to association of endorphin release and nursing babies involves holding, skin to skin contact, sucking, and sweet taste.¹²

An intervention that is natural, cost effective and has no ill effects would be ideal for use in primary care setting for infants receiving immunization. Researcher has literature that breast feeding is natural and effective intervention to decrease pain perception of infants during vaccination .because it is natural ,cost effective ,and has no ill effects , hence ideal to use in primary care setting .¹³

II. BACKGROUND

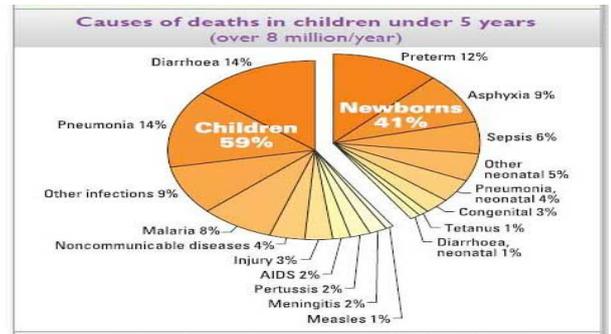
“To cure sometimes, to relieve often, to comfort always”, is a 15th century French description of the role of the physician. Although the relief of pain is felt to be a cardinal principle of compassionate medicine, yet in practice, pain management is often an ignored aspect of care.⁷

children constitute the 40 percent of the total population in our country. Among them infants (0-1yr) constitute 2.92 percent, of them 136 million children born each year in the world. Although the chances of survival of these newborns has improved by 50 percent in the last 20 years, the first few hours, days and months of their lives are still an obstacle race.¹

Since 1990, the world has cut both the rate and number of child deaths by more than one half. In 2015, an estimated 5.9 million children under the age of five will still die, equivalent to 11 every minute. The infant mortality rate of the world is 49.4 according to the United Nations.¹⁴

S.No	Country	Deaths /1000 live births
1.	Afghanistan	115.08
2.	Somalia	98.39
3.	Nigeria	84.59
4.	India	41.81
5.	Nepal	39.04
6.	Iran	38.04
7.	Kenya	39.38
8.	Ghana	37.37
9.	South Africa	32.9
10.	Switzerland	3.67
11.	Italy	3.29

The three major causes of neonatal deaths worldwide are infections (36%, which includes sepsis/pneumonia, tetanus and diarrhoea), pre-term (28%), and birth asphyxia (23%). There is some variation between countries depending on their care configurations.¹⁵



Studies based on 2005 census, revealed that immunization program could cover about 100% of target children in India. Only about 63% of children received all the vaccines (BCG, DPT, OPV, and Measles). In the states of Bihar, Rajasthan, Uttar pradesh, Madhyapradesh, and North East region (combined) coverage levels were relatively lower. During immunization, infants undergo pain due to the prick.¹⁶

Percentage of infants(<1 yr) Immunized against vaccine preventable diseases are

Vaccine	Percentage(%)
BCG	68%
DTP1	86%
DTP3	66%
HepB3	66%
Pol3	66%

Source: National coverage rates (%) (WHO/UNICEF estimates, 2011).¹⁷

Despite of impressive achievement, immunization coverage through national programme remains unsatisfactory. This not only hampers disease control, but consequently diminishes public support for vaccination, and tarnishes the prestige of program, setting up a vicious cycle. The leading cause for this can be overcome by improving vaccination rates, improving the cold chain, increasing vaccines acceptability and increasing demand.² Unfortunately, infants have limited means to cope with pain because they "cannot rub a painful area and stimulate non-nociceptive touch fibers that would block the pain sensation, nor can they distract themselves through visualization."¹⁸

A study of Henry PR, et al.(2004) on the pain in the healthy full term neonate efficacy and safety intervention reveled that, infants response to pain is more exaggerated than adult, resulting in high cortisol production, secretion of Anti diuretic hormone (ADH), breakdown of carbohydrates, fat, protein which causes increased metabolic rate, which raises susceptibility to complications. This response to pain provides strong rational for interventions to reduce pain perception during minor painful procedures.¹⁹

Jacobson RM, et al (2001) studied “Making vaccines more acceptable” in USA, by assessing 150 children in each of 2 age groups. They found that approximately 20 percent of subjects suffered serious distress or worse 1-18 month old children experienced 90 percent and 4-5 years old children showed 45 percent of serious distress. Attitude, empathy, instruction and

practice have all been showed to have salutatory effect up on pain and anxiety with medical procedures in general and specially with vaccines.²⁰

A prospective randomized controlled trial conducted in California which included healthy, full-term infants (N = 66) presenting to a university healthy child clinic for routine 2-, 3-, or 4-month immunization (a combination injection that includes diphtheria and tetanus toxoids and acellular pertussis vaccine). Infants were assigned to either the breastfeeding group (n = 33), in which the infants were encouraged to breastfeed before, during, and after the procedure; or the control group (n = 33). Control group infants were swaddled in a blanket with the leg being injected left uncovered while the baby was placed on a soft-surfaced treatment table. The duration of crying was significantly shorter in the breastfeeding group (mean [M] ± standard deviation [SD] duration, 35.85 ± 40.11 seconds) versus the control group (M ± SD duration, 76.24 ± 49.61 seconds), $P = 0.001$.²¹

A third randomized, controlled study conducted which included healthy, full-term breastfed infants (N = 30) from 2 different hospitals in Massachusetts. The infants were randomly separated into 2 groups: 15 in the breastfeeding group, 15 in the control group. The breastfeeding group was allowed to nurse during blood collection, while the infants in the control group were swaddled and kept in their bassinets during the procedure. Crying, facial grimacing, and heart rate were used to measure the outcomes of this study. Mean cry levels were reduced by 91% and facial grimacing by 84% in the breastfed group. Mean increase in heart rate was also significantly lower in the breastfed group (mean = increase of 6 beats per minute [bpm] above baseline) when compared to the control group (mean = increase of 29 bpm above baseline) ($P = 0.001$). This study also demonstrates that breastfeeding is useful in reducing pain perception in infants.²²

V. Aruna kumara.,(2015) conducted a study on “effectiveness of breast feeding on pain perception during vaccination among infants (n=60) at maternal child health centre, Tirupathi” by a simple random sampling method used and results shows that a significant reduction in the pain perception among infants of experimental group with ‘t’ value 6.689 as per MBPS at 0.05 level of significance and 9.945 as per VAS at 0.01 level of significance ,which emphasizes that breast feeding can be used as an effective pain relieving measure during vaccination .The mean crying duration in control group was 130 sec and experimental group 77sec which supports the intervention in experimental group and it is important even to note that seven babies didn’t even cry during vaccination in experimental group .²³

Lovepreet Kaur et al.,(2009) conducted a quasi-experimental study on “ Effect of feeding the infant on breast during injecting vaccine on perception in Chandigarh ” among 216 infants receiving DPT and its combinant vaccines were randomly distributed into control and experimental group. Infants in the control group (n=106) were administered vaccine without breast feeding and the infants in experimental group (n=110) were administered vaccine during breast feeding. Pre-vaccination and post-vaccination behavior of infants was scored on Modified Behavioral Pain Scale. Cry duration was recorded. The net pain scores and duration of cry was compared among the two groups. Significant difference in

behavioral response of the infants was observed among the infants, $t = 5.5$ at $df = 214$ ($p < 0.01$). It was concluded that the perception of pain intensity is less among the infants when vaccine is administer during breastfeeding.²⁴

Breast-feeding links evolutionary biology and medical practice. This is of clinical interest because pain is routinely experienced in hospital settings, even by healthy newborns, and natural interventions are effective at a time when many pharmacologic interventions are not.²⁸

There are several studies showing that breast milk orosensorially affects pain response.^{25,26} Breast feeding and expressed breast milk is associated with pleasant memories of being with mother for babies.²⁷

Breast feeding is practical as it is easily achievable from the perspectives of health care providers and parents particularly in the situations where acute pain experience is there as for example during blood collections and immunization injections among the neonates as it effectively reduces response to pain.^{26, 27}

More recently, Gray, Watt, and Blass (2000) reported that 10-15 minutes of skinto-skin contact between mothers and infants reduced crying, grimacing, and heart rate during heel lance procedures. In their study, contact alone, in the absence of suckling, dulled pain reactivity. Specifically, crying and grimacing are markedly reduced during blood collection in newborns that are held by their mothers in full-body contact.²⁹

The researcher observed that many children receive immunization with little or no formal attempt made to reduce the fear and pain associated with the injections. As this caused psychological impact for parents and difficulties in administering immunization by the health workers, this inspired the investigator to look out for an alternate method which would reduce the pain threshold of infant during immunization. Hence, the investigator felt the need to use breast feed as an intervention to decrease pain perception during vaccination which is natural, and cost effective.

III. METHODOLOGY

A true experimental approach with A True experimental, post test control group design was adopted for the present study. A total number 200 subjects (100 Experimental group + 100 control group infants) from from urban health centre by ‘simple random sampling’ method . The subjects who fulfilled in the inclusion criteria (In the age group of 1-6 months who Receiving Pentavalent vaccine (Intra muscular), Free from significant illness, Mothers who were willing to participate in the study and Attending at urban health center during data collection)were selected. Written consent was taken from the infants mothers and the purpose of the study was explained.

The **instrument** was organized into three sections.

Section-I: consists of questions related to demographic data. The scoring key was prepared for section-1 by coding the demographic variables

Section II: Part –A : It includes Modified Behavioral Pain Scale by Taddio, et al to assess infants’ pain perception during

clinical procedures. It consist of 3 parameters: facial expression, cry and movements. The maximum score is 10 and the minimum score is 0. **Part-B:** Duration of crying will calculate for all the infants by stop watch beginning with the first needle puncture of skin to absence of audible distress vocalization.

Section -III: Visual analog scale by Wong an baker will use by infant mothers to code infants pain perception during vaccination. Data will collect after vaccination. The score ranges from 0-10. **Score interpretation:** Mild pain: 0-3 , Moderate Pain: 4-7 and Severe Pain: 8-10

The pilot study was conducted and the findings of the study revealed that tool was reliable, feasible to conduct the main study. The obtained reliability was $r=0.96$ which indicate that tool was highly reliable.

The data was analyzed by using descriptive statistics such as frequency and percentage distribution and inferential statistics such as Chi-square test for the strength of the association between two categorical variables and Independent group 't' test to compare the pain perception between experimental and control group.

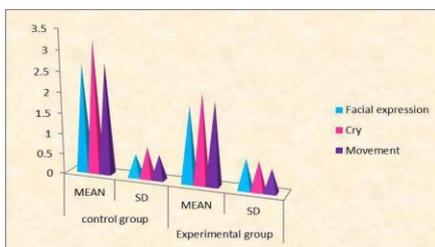
IV. EXPERIMENTS AND RESULTS

The level of pain perception among experimental and control group infants as per modified behavioral pain scale was depicted under the following: Out of 100 infants in control group 78 (78%) had severe pain, 21 (21%) had moderate and 1(1%) had mild pain during vaccination. Whereas in experimental group 10(10%) had mild pain, 74(74%) had moderate and 16(16%) had severe pain.

Table- 2: level of pain perception among infants during vaccination in experimental and control groups as per MBPS

S. No.	Categories	Control group		Experimental Group	
		F	%	F	%
	Mild	1	1%	10	10%
	Moderate	21	21%	74	74%
	Severe	78	78%	16	16%

Table-2 depicts that among 100 infants in control group 78% had severe pain, 21% had moderate and 1% had mild pain during vaccination. Whereas in experimental group 10% had mild pain, 74% had moderate and 16% had severe pain.



The level of pain among infants receiving vaccination in experimental and control groups, as per data given by mothers by using VAS after vaccination as follows: Out of 100 infants in control group 74(74%) had severe pain, 25(25%) had moderate and 1(1%) had mild pain during vaccination. Whereas in experimental group 6(6%) had mild pain, 84(84%) had moderate and 10(10%) had severe pain.

Table- 3: level of pain perception among infants during vaccination in experimental and control groups as per VAS

S. No.	Categories	Control group		Experimental Group	
		F	%	F	%
1.	Mild	1	1%	6	6%
2.	Moderate	25	25%	84	84%
3.	Severe	74	74 %	10	10 %

Table-3 depicts that among 100 infants in control group 74% had severe pain, 25% had moderate and 1% had mild pain during vaccination. Whereas in experimental group 6% had mild pain, 84% had moderate and 10% had severe pain

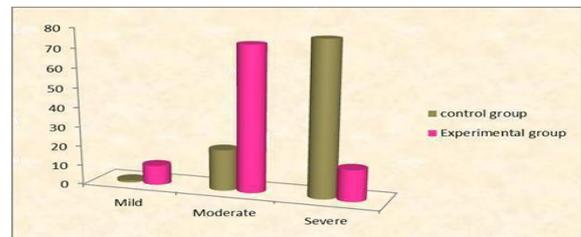


Table-4: Mean, standard deviation of pain perception during vaccination among infants in experimental and control groups as per modified behavioral pain scale.

S. No	Parameters	Control group		Experimental group	
		MEAN	SD	MEAN	SD
1	Facial expression	2.64	0.559	1.85	0.743
2	Cry	3.23	0.763	2.17	0.711
3	Movement	2.71	0.607	2	0.568

The above table-4 reveals that in the experimental group mean facial expression was 1.85, standard deviation 0.74366, mean cry 2.17, standard deviation 0.71145 and mean movement 2, standard deviation 0.5685. In the control group mean facial expression was 2.64, standard deviation 0.55994, mean cry 3.23, standard deviation 0.7635 and mean movement 2.71, standard deviation 0.60794.

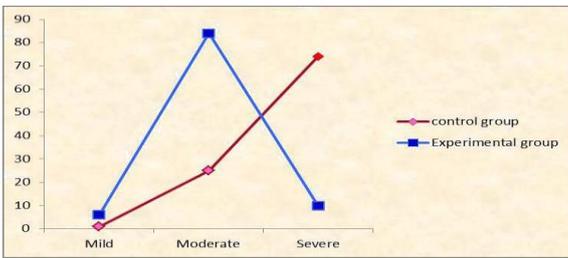


Table-5: Effectiveness of breast feeding on pain perception during vaccination among infants of experimental and control groups.

S. No	Parameters	Control group		Experimental group		't' value	
		MEAN	SD	MEAN	SD	Value	S N
1	Pain perception as per MBPS	8.55	1.54	6.02	1.7	10.748	**
2	Pain perception as per VAS	8.56	1.45	5.5	1.8	12.993	**
3	Crying duration	128.5	52.9	77.2	50	7.0145	**

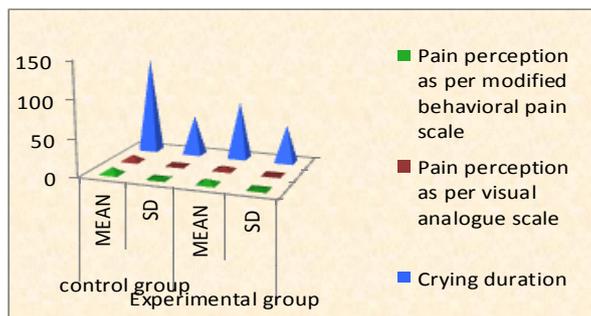
Key: S : Significant, * : significant at 0.05 level

** : significant at 0.01 level

MBPS: Modified behavioral pain scale VAS: Visual analog scale

The data in the table-5 represents that there is a significant reduction in the pain perception during vaccination among infants of experimental group with 't' value 10.7482 for modified behavioral pain scale and 12.9932 as per VAS at 0.01 level of significance, which emphasizes that breast feeding can be used as an effective pain relieving measure during vaccination,

The mean crying duration in control group 128.54 sec and experimental group was 77.27 sec and with "t" value 7.0145 was significant at 0.01 level. Which emphasizes that cry duration was more in control group.



The present study which clearly shows that there was a significant difference in pain perception during vaccination among infants between experimental and control groups. This indicates breast feeding is effective to reduce pain perception during vaccination.

V. CONCLUSION

Vaccine injections are most iatrogenic procedures performed in child hood the major source of distress for children. In this study majority of infants experienced severe pain who were not breast fed and in the experimental group infants who were breast fed majority of them had moderate pain. And there was no significant association between selected demographic variables with pain perception among infants of experimental and control group. These findings suggest that breast feeding is a non-pharmacological measure which is effective convenient and inexpensive, this can be easily adopted as part of standard infant immunization practice.

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