

RESEARCH ARTICLE

EFFECT OF KANGAROO MOTHER CARE ON NEURODEVELOPMENTAL OUTCOME OF BABIES WITH HIE

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Manuscript Info

Abstract

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Key words:-

Amiel-Tison Test, Bailey's Scale of Infant Development, Conventional Method of Care, Hypoxic Ischemic Encephalopathy, Kangaroo Mother Care Intrapartum asphyxia and consequential Hypoxic Ischemic Encephalopathy (HIE) are a common cause of potentially avoidable neonatal brain injury and mortality.HIE occurs in 1.5 per 1000 live births and 2.3 - 26.2 per 1000 live births in developed and developing countries respectively(3,4). Approximately 50% of neonates with severe HIE die, and survivors develop serious and devastating complications including mental retardation, epilepsy, and cerebral palsy. Kangaroo mother care (KMC) is evidence- based technology that centers on the mother as the primary provider of heat and stimulation resulting in an array of benefits for the newborn. But the data on its effect on neurodevelopmental outcome is very limited especially on babies born with HIE.This study was conducted to compare the effects of KMC and conventional method of care (CMC) on the neurodevelopment of the newborns born with HIE.

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Introduction:-

Hypoxic ischemic encephalopathy (HIE) is a brain injury that thwarts adequate blood flow to the infant's brain befalling as a consequence of a hypoxic-ischemic event during the prenatal, intrapartum or postnatal period(1). Intrapartum asphyxia and consequential Hypoxic Ischemic Encephalopathy (HIE) are a common cause of potentially avoidable neonatal brain injury and mortality(2). HIE occurs in 1.5 per 1000 live births and 2.3 - 26.2 per 1000 live births in developed and developing countriesrespectively(3,4). Approximately 50% of neonates with severe HIE die, and survivors develop serious and devastating complications including mental retardation, epilepsy, and cerebral palsy. To enhance neurodevelopmental outcome numerous interventional programs are implemented such as sensory enrichment and individualized developmental care. These interventions have been shown to have a positive impact on attentive, cognitive and psychomotor development. Tactile contact has been shown to affect premature infants' motor maturity and visual habituation(5,6). Skin-to-skin contact in the form of Kangaroo Mother Care (KMC) may similarly contribute to the infant's cognitive development, as KMC integrates rhythmic, sensory, and tactile components into the mother infant contact(7). Kangaroo mother care (KMC) is evidence- based technology that centres on the mother as the primary provider of heat and stimulation resulting in an array of benefits for the newborn. KMC is characterized by four important components namely early skin to skin contact between the mother and the baby, exclusive breastfeeding, early discharge from the hospital and close follow-up at home. But the data on its effect on neurodevelopmental outcome is very limited especially on babies born with HIE.

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Aims & Obectives:-

To compare the effect of KMC versus conventional method of care on neuro developmental outcome in HIE babies.

Research Methodology:-

This comparative observational study was conducted in all Newborns with mild, moderate and severe HIE as per National Institute of Child Health and Human Development [NICHD] admitted in MVJ Medical College and Research.Informed written consent was obtained from the mothers prior to the initiation of the study.

The mothers of KMC group were advised and explained the importance of practicing the components of KMC namely skin to skin contact and exclusive breast feeding. Mothers were explained and monitored to practice exclusive breast feeding as far as possible. They were encouraged to give direct breast feeds or direct breast feeds and expressed breast milk in a sterilized Palade depending on the ability of the baby to suckle. Nurses were provided a KMC chart to mark whenever KMC was given. At discharge, mothers were counselled and advised to continue the KMC. Mothers were advised to do KMC for a minimum of 4 hours in a day and a chart was provided to them to mark whenever KMC was given.

In the Conventional method of care (CMC) group babies were placed in the warmer with a nappy and kept warm in NICU. Mothers were allowed to touch and breast feed babies. Once the baby was stable, they were shifted to mother and kept warm by adequate wrapping and by practicing/bedding in. The babies were also given exclusive breast feeding as far as possible. At discharge mothers were counseled and advised to continue the CMC at home. All babies of both groups were supplemented with micronutrients as per NICU protocol.

Bothgroups were monitored for neurodevelopmentaloutcome. Neurodevelopmental outcome was assessed using Ameil Tison (AT) at 3rd, 6th, 9th and 12 months by a neonatologist.

Statistical Methods:-

Data was entered in MS excel and analysed using SPSS 22 version software. Qualitative data was presented in the form of proportions and pie diagrams, bar charts was used to represent graphically. Quantitative data was presented as mean, standard deviation. Student's t test was the test of significance for quantitative data and chi-square test was the test of significance for qualitative data. p value<0.05 was considered as statistically significant.

Inclusion criteria

- 1. Babies with birth weight more than 2 kgs and gestational age more than 35 weeks with mild, moderate, or severe Hypoxic Ischemic Encephalopathy as per NICHD criteria.
- 2. NICHD criteria includes level of consciousness, spontaneous activity, posture, tone, reflexes, heart rate, respiration, seizures.

Exclusion criteria

- 1. Seriously ill babies who required ventilator support or ionotropic support for more than 1 week.
- 2. Mothers who were unable to stay with their babies because of medical problem.
- 3. Babies with congenital anomalies such as hydrocephalus, microcephaly, meningomyelocele, spina bifida which could affect the neurodevelopmental outcome.

Results:-

In this study a total of 124 newborns with HIE were randomized into two groups with each group receiving either KMC or CMC. There were total of 5 Deaths that occurred before the follow up at 3 months -2 in KMC group and 3 in CMC group. The 5 deaths occurred at post-natal day 25, 32, 46, 47, and 52. Also, there were 4 lost to follow up including 2 in KMC and 2 in CMC group before 9 months of age. 2 of them was lost to follow up because they moved to their hometown following delivery and 2 of them chose not for follow up after discharge.

Tuble It Thinker Theorem 5 months.					
Parameters	Group	Normal	Moderate deficit	Severe deficit	
Passive muscle tone	KMC	17(28.3%)	34(56.7%)	9(15%)	
	CMC	19(32.2%)	22(37.3%)	18(30.5%)	
	TOTAL	36(30.3%)	56(47.1%)	27(22.6%)	

 Table 1:- Amiel-Tison at 3 months.

P = 0.05			
1 - 0.05		P= 0.05	

 Table 2:- Amiel-Tison at 6 months.

Parameters	Group	Normal	Moderate deficit	Severe deficit
Passive muscle tone	KMC	23 (38.3%)	32(53.3%)	5 (8.3%
	CMC	22 (37.3%)	21 (35.6%)	16 (27.1%)
	Total	45 (37.8%)	53 (44.5%)	21 (17.7%)
		P = 0.018*		

Table 3:- Amiel-Tison at 9 months.

Parameters	Group	Normal	Moderate deficit	Severe deficit
Passive muscle tone	KMC	30 (51.7%)	26 (44.8%)	2 (3.4%)
	CMC	24 (42.1%)	20 (35.1%)	13 (22.8%)
	Total	54 (46.9%)	46 (40.0%)	15 (13.1%)
		P = 0.009*		

Table 4:- Amiel-Tison at 12 months.

Parameters	Group	Normal	Moderate deficit	Severe deficit
Passive muscle tone	KMC	30 (51.7%)	26 (44.8%)	2 (3.4%)
	CMC	24 (42.1%)	20 (35.1%)	13 (22.8%)
	Total	54 (46.9%)	46 (40.0%)	15 (13.1%)
		P = 0.009*		

Table 5:- Psychomotor development index at one year.

Group	Normal	Mild delay	Significant delay
KMC (n= 58)	31 (53.4%)	25 (43.1%)	2 (3.4%)
CMC (n=57)	26 (45.6%)	19 (33.3%)	12 (21.1%)
Total	57 (49.6%)	44 (38.3%)	14 (12.1%)
	P = 0.015*		

 Table 22:- Mental development index at one year.

Group	Normal	Mild delay	Significant delay
KMC (n=58)	37 (63.8%)	20 (34.5%)	1 (1.7%)
CMC (n=57)	31 (54.4%)	18 (31.6%)	8 (14.0%)
Total	68 (59.1%)	38 (33.0%)	9 (7.9%)
	P = 0.048*		

 Table 23:- Outcome of the study population.

Outcome	KMC (%) (n=58)	CMC (%) (n=57)	P value
Cerebral palsy	3 (5.1)	5 (8.7)	0.563
Seizures	5 (8.7)	7 (12.4)	0.384
Normal	50 (86.2)	45 (78.9)	0.735
Total	58 (100.0)	57 (100.0)	

In this study 3 (5.1%) had cerebral palsy in the KMC group and 5 (8.7%) had in the CMC group. Seizure was found to be more common in the CMC group (12.4%) compared to the KMC group (8.7%). This difference in outcome was not significant though.

Conclusion:-

The study showed that KMC had a beneficial effect on the neurodevelopmental outcome including, neurosensory and normal muscle tone of the HIE babies compared to those who received the CMC.

Discussion:-

This randomized controlled study was conducted among newborn with mild, moderate or severe HIE to compare the effects of KMC versus conventional method of care on their neurodevelopment during the next one year. HIE is a

condition in which clinical signs point to brain dysfunction(3). Approximately 50% of neonates with severe HIE may have mortality and survivors develop critical and devastating complications such as mental retardation, epilepsy, and cerebral palsy which can result in severe handicap for the children. Due to its severe outcomes and devastating complications HIE requires immediate diagnosis and utmost care and management. Several treatment options are available for the management of HIE including therapeutic hypothermia, antiepileptic medications, erythropoietin, stem cell transplant, Xenon, Docosahexaenoic acid and cannabinoid agents. But these interventions are limited to the tertiary care centers and its use in primary care settings are very limited. For this reason, the usefulness of KMC was studied and compared with CMC in this study.

124 neonates with HIE born in MVJ medical college and research center meeting inclusion and exclusion criteria were randomized into group receiving KMC and group receiving CMC. Baseline characteristics is same in both the groups.

Effectof Kmc On Neurodevelopment Using Ameil Tison At 3, 6, 9, And At 12 Months And Bsid Ii At 12 Months In Hie Babies Compared To Cmc Babies:

At 3 months, 17 (28.3%) babies in the KMC and 19 (32.2%) in the CMC group had a normal passive muscle tone. However, when babies with abnormal passive muscle tone test were compared, the severity of abnormality was higher in the CMC group as 9 (15%) and in the KMC group as 18 (30.5%).

Passive muscle tone examination at 6,9,12 months in the babies whom the deficit was detected it was observed that the severity was much more significant among those who received CMC 16 (27.1%), 13 (22.8%) 13 (22.8%) compared to KMC 5 (8.3%), 2 (3.4%), 2 (3.4%) respectively. This difference was statistically significant as well at 6, 9 and 12 months (P= 0.018, P=0.009 and P=0.009). Though the majority of babies in both groups had normal passive muscle tone at 12 months of age [KMC 30 (51.7%) versus 24 (42.1%)].

Considering BSID II done at one year of age, babies with normal PDI and MDI scores were observed majority of the babies among which 31 in KMC group (53.4%) versus 26 (45.6%) with P =0.015 and 37 (63.8%) versus 31 (54.4%) with P= 0.048. Significant delay was observed more in the CMC group being12 (21.1%) versus 2 (3.4%) for PDI scores and 8 (14%) versus 1 (1.7%) for MDI scores. The difference was statistically significant as well.

In this study we found that the mean weight gain at 3months was not significant but at 6, 9 and 12 months was statistically significant with P value of 0.047, 0.035, and 0.009 respectively

In this study, among 124 neonates 3 children developed cerebral palsy in KMC group whereas 5 in CMC group. Seizures were seen in 5 children in KMC group whereas 7 in CMC group. However, this difference in outcome was not significant.

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