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ORIGINAL ARTICLE

Role of Kangaroo Mother Care in Growth and Breast Feeding Rates in Very Low Birth Weight (VLBW) Neonates

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ABSTRACT

Introduction: World Health Organization has recommended kangaroo mother care for every infant weighing less than 2,000gs who is stable. The Kangaroo mother care (KMC) has been established for last few decades because there are insufficient resources in developing countries to care for infants with low birth weights (LBW).

Methodology: It is a non-controlled retrospective observational cohort.

Results: If we compare the means of the weights and lengths at birth, one month and three months there is statistically significant improvement in both groups. The growth at three months is better in KMC group. The mean of the day of breastfeeding and the KCM intervention are positively associated. The initiation of breastfeeding is different in both groups.

Practical Implications: The intervention has long term benefits as the results have shown better association of KMC at three months. Early initiation and high rate of breastfeeding in KMC group also suggests positive association.

Conclusion: Kangaroo mother care can be implemented as it shows positive outcomes.

Keywords: Kangaroo Mother Care, Kangaroo mother method, Exclusive breastfeeding, neonatal care, Low birth weight.

INTRODUCTION

World Health Organization has recommended kangaroo mother care for every infant weighing less than 2,000gs who is stable. The Kangaroo mother care (KMC) has been established for last few decades because there are insufficient resources in developing countries to care for infants with low birth weights (LBW) [1]. It can be performed at home and is readily accepted by mothers[2]. KMC can be recommended for all babies who are stable weighing less than 2,000 gs. Continuous skin to skin contact of the newborn to their care-taker is a vital component in KMC care plan, which is founded on scientific data. This is related to supporting early hospital discharge and exclusive breastfeeding. KMC is associated with less mortality compared to incubation. Due to a lack of data, the WHO does not recommend KMC for infants who are "slightly stable or unstable." With numerous current or just ended trials in Africa, it is imperative to address this evidence vacuum[3]. Preterm and LBW (low birth weight) newborns require incubators, which are expensive, highly technical, require specialized personnel, and necessitate routine maintenance. In addition, incubators separate infants from their moms, denying them the necessary socialization. Thus, it is difficult to provide sufficient care for LBW infants, and hypothermia and nosocomial infections are widespread in developing nations with low resources. KMC is a suitable substitute, in some cases, more effective than an incubator for caring for preterm and LBW infants in certain circumstances. KMC is currently regarded as practicable, easy and preferable for reducing morbidity and mortality in babies both industrialized and less developed countries[4]. According to global health guidelines, newborns should be breastfed for six months exclusively. This has unsurpassed favorable outcomes linked to nutrition, immunity, and cognition. This recommendation also applies to premature infants because they are typically more susceptible to infections and chronic disease and because the benefits of nursing are more obvious for premature infants. Because their sucking behavior is immature and they require extended neonatal care, it is clinically more challenging to manage these preterm newborns in terms of breastfeeding initiation and duration. There is no information regarding the rate of exclusive breastfeeding among preterm newborns in Bangladesh, where it decreased from 62 to 54 percent. Due to the high prevalence of preterm birth in Bangladesh, this may have an effect on the lowering exclusive breastfeeding rate. In Sweden and Germany, 3-17% of PT neonates were breastfed exclusively for 5 - 6 months of age after correction. It is challenging to transition from tube feeding to nursing on your own. KMC has a solid evidence base, and is recognized useful practice that helps mothers get to know the babies, improves motherhood experience, and boosts the frequency time of breastfeeding. High as well as low income countries have reported infants who receive KMC likely to be breastfed upon discharge more than those who receive conventional care[5]. A few common breast-feeding recommendations have been produced by various organizations in an effort to reach a consensus among diverse cultural beliefs. The practice of breastfeeding varies across the globe and is heavily impacted by cultural and ethnic norms. The World Health Organization (WHO) suggests that all babies be breastfed for a minimum of two years. The American College of Obstetricians and Gynecologists (ACOG) guides for exclusive breastfeeding for six months for each neonate. The American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) suggest breastfeeding should be exclusive for six months then continue to minimum of one year and as long as both parties agree. Similarly to breastfeeding, kangaroo care (KC) is an essential component of care. KMC was initially introduced by less developed nations in an effort to lower the expense of delivering neonatal healthcare in NICU or hospital settings. This approach to neonatal care subsequently spread to the industrialized world as a result of its enormously favorable consequences. A perfect KC, as recommended by the World Health Organization, entails placing the baby skin to skin and upright on bosom of mother. This type of care may be provided constantly[6].

Objective: To calculate growth rate in low birth weight infants in kangaroo mother group and non-intervention group and compare the breast-feeding rates in these two groups.

MATERIALS AND METHODOLOGY

It is non-controlled retrospective cohort study of two groups of mothers. Out of which one consisted of mothers who experienced Kangaroo Mother Care/ Kangaroo Mother Method (KMC) and the other group had no intervention. The two groups were selected from the Indus Hospital, Karachi and the permission was taken from ethical committee before gathering the data. The Kangaroo Mother Method is being used for neonatal care but there was no study before at this particular hospital. We collected details of all the mothers and neonates who underwent the KMC process were collected from hospital data and also collected data from the same time duration of the same department of low birth infants who had no KMC for comparison purpose. The data included the weights

and heights of the babies at, birth, one month and three months. Gender of baby, data of parity (how many siblings the baby had) and education of mother were also recorded. The day of implementation of KMC and the day of initiation of breast feeding were also noted. The deaths, normal birth weight patients were excluded. Only very low birth weight patients <1.5kg (3.5 pounds) who needed a hospital stay were included. After considering inclusion and exclusion criteria we got data of 125 neonates who had KMC and took the second group of 131 babies taken as a comparison group.

The data was analyzed on SPSS. Means and SD were measured and t-test was done to compare means of the continuous variables.

RESULTS

The means of weights and lengths were 3.32, 4.2, 7.2 ponds and 34, 37 and 54cm for birth, first month and third month respectively. (Table: 1)

The intervention group was 125 babies out of 256 low birth weight babies out of which 51.2% were males. 36 women started breast feed at 1st day and 119 started on second day with maximum time of initiation to be day 5. The mean of day of breastfeeding initiation is 2.5. 108 mothers had formal education less than 10 years. There were 88 kids who were the very 1st child of their parents. The frequency of exclusive breastfeed at the day of discharge was 151. (Table: 2)

Table1: Means of the continuous variables

	Birth-weight(kg)	weight_ 1month(kg)	weight_ 3month(kg)	Length at birth (cm)	Length at 1mo (cm)	length at 3 mo (cm)
Mean	3.3252	4.3896	7.4167	34.267	37.835	54.526
Median	3.4000	4.3400	7.3150	34.500	38.000	54.500
Std.Deviation	.21224	.59790	1.61427	1.8083	1.4465	2.4515
Minimum	2.70	2.98	.84	26.5	33.0	41.0
Maximum	4.20	6.49	10.95	38.0	41.0	62.0

Table 2: Descriptive Statistics

Kangaroo Mother Care Intervention				
	Frequency	Percent	Valid Percent	Cumulative Percent
No	131	51.2	51.2	51.2
Yes	125	48.8	48.8	100.0
Total	256	100.0	100.0	
Gender				
	Frequency	Percent	Valid Percent	Cumulative Percent
Male	131	51.2	51.2	51.2
Female	125	48.8	48.8	100.0
Total	256	100.0	100.0	
Day at which the breast feeding was initiated				
	Frequency	Percent	Valid Percent	Cumulative Percent
1	36	14.1	14.1	14.1
2	119	46.5	46.5	60.5
3	48	18.8	18.8	79.3
4	38	14.8	14.8	94.1
5	15	5.9	5.9	100.0
Total	256	100.0	100.0	
Mother education				
	Frequency	Percent	Valid Percent	Cumulative Percent
less than 10 years education	108	42.2	42.2	42.2
more than 10 less than 14 years	44	17.2	17.2	59.4
14 years and more education	104	40.6	40.6	100.0
Total	256	100.0	100.0	
Parity				
	Frequency	Percent	Valid Percent	Cumulative Percent
singlet	88	34.4	34.4	34.4
1 sibling	87	34.0	34.0	68.4
2 siblings	48	18.8	18.8	87.1
3 or more siblings	33	12.9	12.9	100.0
Total	256	100.0	100.0	
Breast feeding pattern				
	Frequency	Percent	Valid Percent	Cumulative Percent
Breast feed plus other milk	105	41.0	41.0	41.0
Exclusive breast feeding	151	59.0	59.0	100.0
Total	256	100.0	100.0	
weght at birth				
	Frequency	Percent	Valid Percent	Cumulative Percent
<3.2kg	62	24.2	24.2	24.2
>3.2kg	194	75.8	75.8	100.0
Total	256	100.0	100.0	
weight at one month				
	Frequency	Percent	Valid Percent	Cumulative Percent
<4.2kg	106	41.4	41.4	41.4
>4.2kg	150	58.6	58.6	100.0
Total	256	100.0	100.0	
weight at 3 months				
	Frequency	Percent	Valid Percent	Cumulative Percent
<7.2kg	125	48.8	48.8	48.8
>7.2kg	131	51.2	51.2	100.0
Total	256	100.0	100.0	
length in cm at birth				
	Frequency	Percent	Valid Percent	Cumulative Percent
<33cm	53	20.7	20.7	20.7
>33cm	203	79.3	79.3	100.0
Total	256	100.0	100.0	
length in cm at 1 month				
	Frequency	Percent	Valid Percent	Cumulative Percent
<37cm	87	34.0	34.0	34.0
>37cm	169	66.0	66.0	100.0

Total	256	100.0	100.0	
length at 3 months in cm				
	Frequency	Percent	Valid Percent	Cumulative Percent
<54cm	119	46.5	46.5	46.5
>54cm	137	53.5	53.5	100.0
Total	256	100.0	100.0	

If we compare the means of the weights and lengths at birth, one month and three months there is statistically significant improvement in both groups. The mean of the day of breastfeeding and the KCM intervention are positively associated. (Table: 3)

Table 3: One-Sample Test for Comparison of Means

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Birth weight	250.669	255	.000	3.32520	3.2991	3.3513
weight_1month	117.467	255	.000	4.38957	4.3160	4.4632
weight_3month	73.511	255	.000	7.41665	7.2180	7.6153
	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Length at birth (cm)	303.201	255	.000	34.2668	34.044	34.489
Length at 1months(cm)	418.494	255	.000	37.8348	37.657	38.013
Length at 3 months(cm)	355.871	255	.000	54.5258	54.224	54.828
One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Day at which the breast feeding was initiated	37.049	255	.000	2.520	2.39	2.65
kangaroo mother care Intervention	15.599	255	.000	.488	.43	.55

Weight and length at birth is significantly important to respond to KMC, weight gain at one month is also important. Exclusive breastfeeding is more associated with better birth height and weight (p< 0.000) Table: 4

Table 4: Independent sample t-test for Kangaroo mother intervention

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
weight at birth	15.680	.000	1.970	254	.050	.105	.053	.000	.210
			1.964	244.655	.051	.105	.054	.000	.211
weight at one month	5.766	.017	1.330	254	.185	.082	.062	-.039	.203
			1.329	252.537	.185	.082	.062	-.039	.203
weight at 3 months	2.108	.148	-11.318	254	.000	-.579	.051	-.680	-.478
			-11.335	253.923	.000	-.579	.051	-.680	-.478
length in cm at birth	53.820	.000	3.500	254	.001	.174	.050	.076	.272
			3.474	224.096	.001	.174	.050	.075	.272
length in cm at 1 month	.635	.426	.400	254	.690	.024	.059	-.093	.141
			.400	252.958	.690	.024	.059	-.093	.141
length at 3 months in cm	3.915	.049	2.501	254	.013	.155	.062	.033	.276
			2.500	252.815	.013	.155	.062	.033	.277
Exclusive and non-exclusive breast feeding									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
weght at birth	7.318	.007	1.313	254	.190	.072	.054	-.036	.179
			1.338	237.641	.182	.072	.053	-.034	.177
weight at one month	.596	.441	.380	254	.705	.024	.063	-.100	.148
			.380	224.894	.704	.024	.063	-.100	.147
weight at 3 months	.140	.708	-.946	254	.345	-.060	.064	-.186	.065
			-.946	223.444	.345	-.060	.064	-.186	.065
length in cm at birth	5.759	.017	1.171	254	.243	.060	.052	-.041	.162
			1.195	238.455	.233	.060	.051	-.039	.160
length in cm at 1 month	.135	.714	.183	254	.855	.011	.060	-.108	.130
			.183	224.790	.855	.011	.060	-.108	.130
length at 3 months in cm	4.010	.046	1.224	254	.222	.078	.063	-.047	.203
			1.226	225.540	.221	.078	.063	-.047	.202

The breast feeding initiation day and the Kangaroo Mother Care affect the progress of growth. There is not much affect seen on first month but the difference at the 3 months is quite high between the two groups. Female child's length at birth is less than male child. (Table: 5)

Table 5: 2*2 Contingency Tables

kangaroo mother care intervention				Total
		No	Yes	
weight at 3 months	1	101	24	125
	2	30	101	131
Total		131	125	256

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	85.819[a]	1	.000		
Continuity Correction[b]	83.518	1	.000		
Likelihood Ratio	91.498	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	85.484	1	.000		

N of Valid Cases[b]	256				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 61.04.					
b. Computed only for a 2x2 table					
day at which breastfeeding was initiated					Total
		1		2	
weight at 3 months	1	63		62	125
	2	92		39	131
Total		155		101	256
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.529[a]	1	.001		
Continuity Correction[b]	9.715	1	.002		
Likelihood Ratio	10.601	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	10.487	1	.001		
N of Valid Cases[b]	256				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 49.32.					
b. Computed only for a 2x2 table					
Gender					Total
			Male	Female	
length in cm at 1 month		<33cm	33	54	87
		>33cm	98	71	169
Total			131	125	256
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.247[a]	1	.002		
Continuity Correction[b]	8.462	1	.004		
Likelihood Ratio	9.311	1	.002		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	9.211	1	.002		
N of Valid Cases[b]	256				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 42.48.					
b. Computed only for a 2x2 table					
Female babies weight at birth is less than male babies at birth					
kangaroo mother care intervention					Total
			No	Yes	
length at 3 months in cm		1	51	68	119
		2	80	57	137
Total			131	125	256
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.153[a]	1	.013		
Continuity Correction[b]	5.547	1	.019		
Likelihood Ratio	6.176	1	.013		
Fisher's Exact Test				.017	.009
Linear-by-Linear Association	6.129	1	.013		
N of Valid Cases[b]	256				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 58.11.					
b. Computed only for a 2x2 table					
Crosstab					
day at which breastfeeding was initiated					Total
			1	2	
length at 3 months in cm		1	81	38	119
		2	74	63	137
Total			155	101	256
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.265[a]	1	.022		
Continuity Correction[b]	4.693	1	.030		
Likelihood Ratio	5.302	1	.021		
Fisher's Exact Test				.029	.015
Linear-by-Linear Association	5.244	1	.022		
N of Valid Cases[b]	256				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 46.95.					
b. Computed only for a 2x2 table					
kangaroo mother care intervention					
			kangaroo mother care intervention		Total
			No	Yes	
day at which breastfeeding was initiated		<2.5	60	95	155
		>2.5	71	30	101
Total			131	125	256
Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24.420[a]	1	.000		
Continuity Correction[b]	23.172	1	.000		
Likelihood Ratio	24.965	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	24.324	1	.000		
N of Valid Cases[b]	256				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 49.32.					
b. Computed only for a 2x2 table					

DISCUSSION

95 mothers out of 125 KMC group had initiated breastfeeding in less than 2.5 days (76%) while 60 out of 131 (45%) from comparison group started feed in less than 2.5 days. The mean growth was significant in both groups and there was no difference at one month but long term results show better growth in KMC group. KMC promotes breastfeeding rates and the health of

VLBW newborns is positively affected. KMC is an important aspect of neonatal care and should be a fundamental aspect of newborn care. All included research in this systematic review, with the exception of one, either had a positive effect on growth and breastfeeding rates or had no effect[7]. Secondary outcomes or serious adverse events were not different between the two arms (control: 28/139 (20%); intervention: 30/139 (22%); none connected; none correlated). 1/3rd of babies intervened were back to usual care for medical reasons. Due to insufficient statistical power of the experiment and the halving of baseline neonatal death, it is imperative to implement limited and insufficient baby care therapies. Before implementing adjustments to international regulations, additional mortality effect and safety data from a variety of LMI newborn unit settings are necessary[3]. Ninety percent of KMC infants were exclusively breastfed at discharge, compared to 60% of newborns of control group (p0.001). KMC group, the average length of hospitalization was 10.6 days, compared to 18.2 days in the control group. (p=0.15) This difference was not statistically significant. Mortality in the KMC group was 2 (5%), and it was 6 (15%) in the control group; neither difference was statistically significant (P=0.14).

KMC was found to be effective in the treatment of LBW infants and to have a greater effect on weight growth and the establishment of exclusive breastfeeding in this study. Hence, KMC is recommended for newborns with a low birth weight[4]. The average start-up time for a KMC was 1.80 1.09 days. The average birth weight of infants in both groups was between 120 and 1400 grammes. In the KMC group, it took an average of 9.35 days to complete full enteral feeding, while the control group required 14.35 days (p 0.001). In the KMC group, exclusive breastfeeding was much more prevalent at discharge (38/95%) than in the control group (24/60%). (p 0.001). In addition, the rate of weight gain in the KMC group was substantially greater (18.35 + 7.81 g) than in the control group (13.55 + 4.80 g) (p 0.001). KMC is more effective in terms of establishing early feeding and exclusive breastfeeding in premature newborns. Less infections and greater weight growth are connected benefits[5]. Infants who got KMC and weighed less than 1500 grammes at birth spent less time in the hospital than those who received standard care. Although there were comparable rates of infections in both groups, infants who received KMC had milder illnesses. When rectified, a greater proportion of these infants received breast milk until the age of 3 months. These results validate previous research on the benefits of KMC on growth and mortality. Implementation of this strategy will encourage breastfeeding, humanize the field of neonatology, and shorten newborns' hospital stays without hurting their chances of survival, growth, or development[8]. There were no statistically significant differences between treatment groups in case of exclusive breastfeeding after hospital discharge, or breastfeeding at the breast during hospitalization. Older women with more education adopted more. Regardless of the group to which they were randomly allocated, mothers who practiced KC were more likely to deliver than those who did not. The majority of women with higher levels of education remained breastfeeding the longest. KMC group did not have promising outcomes. KC is of considerable help to both the parental process and the infant's perceptual-cognitive and motor development. We hypothesize that KC influences newborn development both directly and indirectly through influencing the mood, perceptions, and social behavior of parents. Seeing results and affordability of KMC and breastfeeding, it is possible to conclude that neonatal care is multifactorial and that breast feeding and kangaroo care help to maximize the results of an optimal newborn care[6]. Early SSC greatly enhanced the proportion of infants that were exclusively breastfed at 6 weeks of age among healthy term neonates. After episiotomy repair, the level of discomfort experienced by mothers in the SSC group was significantly decreased. Kangaroo Mother Care (KMC) is the best method for ensuring that all newborns, especially those who are premature or underweight, have regular skin-to-skin contact with their mothers.

This method is still unusual in other countries, including many hospitals in Iran. KMC is more effective in promoting exclusive breastfeeding. It can act as a suitable substitute for CMC (conventional methods of care). It is a viable, safe, and safe type of care for LBWI even in NICU settings[13]. A multivariate analysis did not account for the significant baseline differences in socioeconomic status and infants' health status between the two cohorts of study which contributed to the Kangaroo Infants' slower growth in the first three months and higher percentage delay in development at one year. Despite substantial differences at birth between analyzed cohorts, the survival of LBW babies in Bogotá is comparable between KMI and "standard care." Early breastfeeding is a low cost, less complex intervention with the potential to significantly improve child health and should be universally recommended. Throughout the first 12 hours and beyond, the survival rate of preterm low birth weight infants getting early kangaroo mother care was significantly higher than that of newborns receiving conventional care. More than 95% of mothers indicated that they were pleased to care for their infants with less weight using the early KMC approach. It was suggested that the viability and effectiveness of KMC at the local level be investigated. Women who utilized skin to skin contact delivered birth an average of four weeks later than those in the control group. Six-month-old newborns that experienced skin-to-skin contact screamed significantly less than the control group.

Babies with a very low birthweight can benefit from skin-to-skin contact, particularly in developing countries where the mother's capacity to breastfeed is essential. By the conclusion of the study, more KMC infants were exclusively breastfed (98% vs. 76%), although the length of stay before discharge was not different. The majority of women and domestic households supported KMC. The benefits of KMC for infants with less weight are enhanced growth and lower morbidities. A pleasant, simple method for mothers, and easy to replicate. Compared to conventional care approaches, kangaroo mother care increases early commencement of breastfeeding. Therefore, hospitals are required to execute the kangaroo mother care program for premature and infants with less weight. Very early skin to skin contact is an effective strategy that increases breastfeeding rates, mother satisfaction, newborn sucking proficiency, temperature regulation, and weight distribution. Early KWC enhances health of preterm babies at gestational age similarly to IIC[21]. Stable VLBW infants getting kangaroo mother care in the kangaroo ward have no higher rates of morbidity or mortality than those receiving conventional care in the neonatal hospital. The care provided by kangaroo mothers promotes health and decrease morbidity in infants with low birth weight. It is simple, pleasant to women, and may be performed independently. When administered to vulnerable newborns during a crucial stage of brain development, MC has a long-lasting impact on self-regulation capacities in later childhood[24]. Until one month after discharge, early KMC group had the highest rate of exclusive breast feeding (86%) [25].

CONCLUSION

As the KMC group has better long term outcomes and has a better rate of breastfeeding early, we may conclude that the KMC method has positive impact on breastfeeding and long term growth of child.

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