

Research Article

First Experience of Implementation of Kangaroo Mother Care in Punjab- Pakistan to Reduce Morbidity and Mortality in Preterm Infants

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Abstract | The study was planned to assess the effect of Kangaroo Mother Care on preterm and stable neonates in reducing neonatal morbidity and mortality. This is a case series design of 121 preterm and low birth weight neonates, weighing less than 2500 gram, enrolled from 1 August 2016 till 31 January 2017. Kangaroo Mother Care is initiated after birth, after performing early essential newborn care practices. Weight gain of 20-30 gram for three consecutive days, establishment of breast-feeding for 20-30 minutes every two hourly and maintenance of body temperature at 37 degree centigrade is the discharge criteria. During the period of six months, total number of deliveries was 6459, out of them spontaneous vaginal deliveries were 52.2% (3372) and caesarean sections were 47.7% (3087). In 55.4% neonates (both preterm and term) early essential newborn care was practiced. Total preterm were 290 (4.5%), out of them 121 (2%) neonates were kept in Kangaroo Mother Care position and 129 (44%) were shifted to neonatal intensive care unit. 14% parents refused for KMC position and discharged. Mortality in preterm newborn in neonatal unit was 29.4% (without KMC) but no mortality occurred after 3 months follow up in KMC babies. All the neonates from KMC unit were discharged in satisfactory condition and called for follow up investigations. All Kangaroo Mother Care babies had exclusive breast-feeding. Taken together, the results indicate that prolonged skin-to-skin contact and exclusive breast feeding reduces neonatal mortality and morbidity in birth weight 1.5 to 2.5 kg in stable neonates in hospital. However KMC is limited to SHL at present. Workshops are being conducted to teach other doctors and nurses for early essential newborn care and kangaroo mother care. They are still facing controversies and challenges in initiation of KMC in many hospitals. However it is essential to strengthen KMC services in healthcare facilities as it significantly reduces neonatal mortality.

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Introduction

Each year approximately twenty million low birth weight babies are born globally⁽¹⁾. Prematurity is one of the most common causes of low birth weight. Low birth weight results in 60% to 80% of neonatal

deaths. About 27% of 4 million neonatal deaths every year are due to prematurity⁽²⁾. Neonatal mortality contributes to two - third of all deaths under the age of five years. Pakistan has NMR of 55/1000 live births⁽³⁾. Low birth weight infants are not only associated with neonatal mortality but also infant mortality⁽²⁾. Such

infants become a challenge and burden on health and social system. Pakistan is amongst the top three countries with the highest neonatal mortality and has to reduce NNM for a sustainable developmental goal by 2030 to 12 per 1,000 live births. Pictures below gives a glimpse of KMC.



Care of low birth weight babies (less than 2500 gm) is expensive and requires specialist care. Effective interventions and modern technology is limited in developing countries. There is shortage of skilled staff and incubators. Maintenance of equipment is also very expensive. Incubator care costs about Rs 5000 per day that is 50 dollars per day and total cost of hospital is about three thousand dollars at private setup. Kangaroo Mother Care is an effective and safe substitute of incubators for preterm infants. Breast-feeding success rate is only 20% while in KMC babies it is exclusive breast feeding ⁽³⁾.

Kangaroo Mother Care was first proposed by Rey and Mortinez in 1978 in Bogota, Colombia. It was alternative to incubator, where care of preterm infants was not satisfactory⁽⁴⁾. In North America, Gene Granston Anderson and Susan Ludington introduced Kangaroo Mother Care for the first time⁽⁵⁾. Kangaroo Mother Care is now recognized by global experts as an integral part of new born care for premature and low birth babies⁽⁶⁾.

Kangaroo Mother Care promotes maternal bonding, confidence and increases milk production resulting in successful breast feeding.⁽⁷⁾ If mother is unable to carry baby due to section or any other medical problem, father or other family members can also give Kangaroo Care.⁽⁸⁾ Kangaroo Mother Care prevents hypothermia and, normalizes heart rate and respiratory rate resulting in decreased nosocomial and respiratory tract infections. ⁽⁹⁾Weight gain is more in KMC babies with improvement in sleep pattern and relief for colic. ^{(10), (11)}



Figure 1: KMC KIT

With the support of UNICEF Kangaroo Mother Care project was started to improve neonatal care. KMC kit is shown in [Figure 1](#). Master trainers were

trained in Vietnam in June 2016 and started the project at Service Hospital Lahore and further trained other doctors and nurses from and other districts of Punjab and Sindh by multiple workshops.

We conducted this study to determine the effects of early skin-to-skin contact and kangaroo mother care (KMC) on the growth, development and survival of preterm and low birth weight infants. Results of our study will help us to determine whether execution of KMC is a cost-effective approach in preventing neonatal mortality on wider scale.

Material and Method

The study was carried out in the department of Obstetrics and Gynaecology department Services Hospital Lahore in Gynae unit 2 and 3. The study started from 1 August 2016 till 31 January 2017 for six-month duration. Figure 2 shows mortality in preterm babies in this period. It is a case series study. In this study, all the stable pre-term babies with weight between 1.5 to 2.5 kg were included. The babies that required immediate admission in neonatal unit due to any reason after birth were not included in the study. Initially for three month our criteria was 2-2.5kg weight but now we extended to 1.5 to 2.5 kg as the results obtained from KMC were satisfactory. All the babies received early essential newborn care (EENC) (Figure 3).

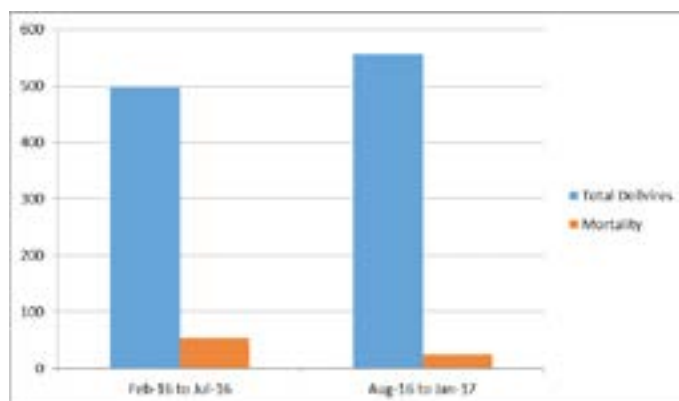


Figure 2: Mortality in preterm babies from August 2016 to January 2017 in comparison to 45% mortality from Feb to July 2016.

Components of KMC are:

1. Skin to skin contact
2. Exclusive breast feeding
3. Monitoring for feeding, growth, temperature regulation and prevention of infection
4. Early discharge

5. Follow up

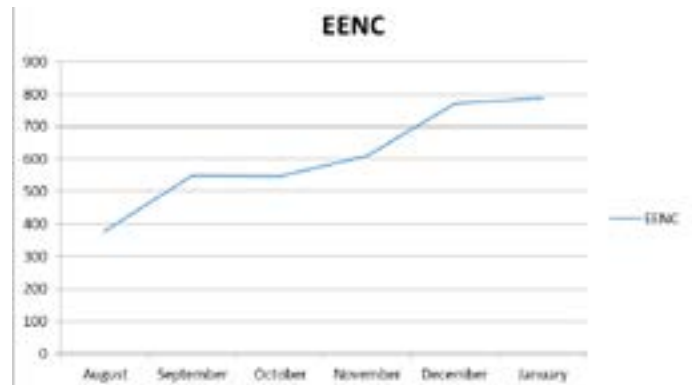


Figure 3: EENC performed from Aug 2016 to Jan 2017.

Skin to skin contact improves bonding between mother and neonate, decreases the risk of infection and hypothermia and helps in breast feeding. Exclusive breast-feeding also reduces the risk of neonatal infection and hypothermia. KMC is a cheap alternative; just a binder, cap and diaper for baby and gown for mother are required. In winter socks for baby is also essential. The method can be continuously used or intermittent in which baby is not kept in binder for twenty-four hours. KMC room is developed near labour room of the department of obstetrics and gynecology. Initially it is 4 bedded ward.

Infection prevention techniques are practiced. Doctors, paramedics and mothers are trained for the steps of hand washing techniques. Mother is asked to hand wash before and after breast feeding, massage and even touching the baby.

Temperature of room is maintained at 25 -28 C and of baby at 37 C. All KMC babies who are entered in the study group should be stable with no medical problem and admission in neonatal unit is not required.

Consent is taken for KMC position. Counseling is done by doctors, nurses and paramedics to parents and other relatives. In counseling advantages of KMC, position by binder and gown, duration of stay and follow up is explained.

Mother wears binder and gown and keeps baby in skin-to-skin contact. If less than 20 hours contact it is intermittent KMC otherwise continuous KMC. Breast feeding is established. If baby is unable to take feed, give by cup, spoon or by feeding tube. Monitoring of baby is done by daily weight, temperature and

duration of breast feeding, weekly by length and head circumference for growth of baby. Round by paediatrician is done daily.

Criteria for discharge is weight gain of 15 to 20 gram daily for three consecutive days and breast feeding es-

tablished for 20 to 30 minutes. After discharge Baby is called for examination and routine follow up weekly till 40 weeks of gestation, then after one month, then after three months and finally after six months. Data is summerized in [Table 1](#).

Table 1: KMC data.

KMC Data											
	Total Deliveries	Total EENC	Percentage	Pre-Term Total (G2+G3)	%	KMC	%	Sent to nursery	%	Refusal	%
August	1128	380	33.6%	39	3.4%	11	28%	18	46%	10	25%
September	1147	551	48%	32	2.7%	12	37.5%	12	37%	8	25%
October	1088	547	50%	54	5%	18	33.3%	28	51%	8	14.8%
November	1038	611	59%	60	5.7%	24	40%	30	50%	6	10%
December	1021	772	75.6%	55	5.3%	25	45%	26	47%	4	7.2%
January	1004	789	78.5%	51	5%	32	62%	15	29.4%	3	7.8%
Total	6459	3372	52.2%	291	4.5%	121	42%	129	44%	40	14%
Pre-term %				4.4%		2.0%		1.8%		0.6%	

Table 2: General characteristics of KMC Mother (121).

Number Characteristics			Number	Percentage
1	Age	<20 years	18	14.8
		20 – 30 yrs	67	55.3
		>30 years	36	29.7
2	Parity	P1 – P2	52	42.9
		P3 – P4	55	45.4
		P5 or more	14	11.5
3	Education Status	Educated	47	38.8
		Uneducated	73	60.3

Table shows most of the KMC mothers are between 20 and 30 years.

Regular follow up and Feedback is taken to improve the quality and to determine the effectiveness of project.

In this study the neonates were followed for a period of three months atleast. General characteristics of KMC mother and neonates are given in [Table 2](#) and [Table 3](#), respectively.

Results and Discussion

Pakistan, with 748,100 preterm births annually has the fourth highest number after India ⁽¹⁾. In low revenue countries such as Pakistan the burden on health systems produced by care of preterm infants is well recognized. Indeed it is estimated that the cost of care for a single preterm birth is Rs.5000 per day in incu-

bator. The resources available are fewer, characterized by understaffed hospitals with ill equipped or non-existent neonatal care units which ultimately result in higher neonatal mortality rates.⁽¹²⁾

Table 3: General characteristics of KMC Neonate (121).

Number	Characteristics		Number	%age
1	Weight of baby	1.5 – 2 kg	48	39.6
		2 – 2.5 kg	73	60.3
2	Gestational age	36-37 weeks	12	9.9
		34-36 weeks	72	59.5
		< 34 weeks	49	40.4
3	Stay in hospital	1 – 3 days	11	9.0
		4 – 6 days	73	60.3
		7 or above days	37	30.5
4	Temperature	36.5 – 37.5 C	104	85.9
		< 36 C	17	14.0
5	Refer to nursery		5	4.1
	Came back from nursery		5	4.1
6	Exclusive Breast feeding		121	100
7	Satisfactory Weight gain	Yes	121	100

*Babies referred to nursery : five babies were referred to the nursery – one with cord infection, two with jaundice, two with sepsis – all recovered and came back to KMC.

Satisfactory weight gain is increase of weight 20-30 gram per day for three consecutive days.

In a study carried out in Bangladesh, implementing early Kangaroo mother care in rural area to assess outcome of preterm neonate. The study was conducted on stable and unstable ill low birth weight babies. Continuous skin to skin was given to unstable babies and intermittent KMC to stable babies. Workshop of team members was carried out for care of KMC babies. In the study there was no intensive neonatal unit as it was done in rural area. In this study the percentage of breast-feeding during hospital stay was 85%. This study found that the practice of providing KMC to LBW babies showed a significant change.⁽¹³⁾ Our study was first experience of Kangaroo mother care project which is carried on stable babies who do not need admission in nursery. Continuous skin to skin is provided. Workshops are also carried out for doctors and nurses of same unit and of other units. Training was given about care, monitoring and regarding criteria of discharge. There is intensive neonatal unit in which if required baby can be shifted. Percentage of breast feeding for Kangaroo mother care babies is 100%.

Table 4a: *Follow-up of KMC Babies. Data of Follow Up From August to January.*

Total KMC Babies	Physical Follow Up	Telephonic Follow Up	Present Status	Not Reachable
Number	70	32	102	19
Percentage	57%	26%	83%	16%

Table 4b: *Follow-up of KMC Babies. Schedule of Follow Up.*

Follow-up	Number	Percentage
After 1 week till 40 weeks.	107	83.4
After 1 month	92	76.0
After 3 months	55	45.4
Outcome	Alive (only in reachable babies)	121 100

As already mentioned in Table 4 that outcome indicators after three month were weight gain, feeding criteria and no mortality occurred. All three parameters were satisfactory. No record in babies not reachable in follow-up studies.

In our study no mortality in KMC babies noted. Table 4 (a and b) shows schedule of follow up of KMC babies. Joy E Lawn in 2010 assessed overall health benefits of preterm babies from KMC. Benefits lie in weight gain, breastfeeding, psycho- social outcome like bonding and especially satisfaction of mothers.

The meta- analysis of observational study showed marked reduction of neonatal mortality. In the control group the babies were kept in incubator. Most of the neonatal mortalities were due to infections. Then KMC was started in stable preterm babies which show significant reduction in mortality⁽¹⁴⁾.

KMC was first established by Dr. Jose Fabella in 1999 in Manila. Due to good results, within two years seven more hospitals were opened in same city. The workshops were conducted for training of medical staff for KMC babies. In 2008 Bless Tetada KMC foundation was made for monitoring the working of all KMC centers.⁽¹⁵⁾ According to Fabella, neonatal mortality in preterm was reduced by 15%. The percentage of sepsis was reduced from 34% to 24%. There was increase in breast feeding of babies for first six months. The duration of stay in hospital was reduced to 50% and estimated savings of cost was 75%.

In our study initially KMC center opened in Services Hospital Lahore. Workshops were conducted first for medical staff of same hospital, then to other hospitals of same city. Few members of other hospitals are also trained. Gradually KMC centers will be increased.

No neonatal death was found in KMC babies in last six months data (Table 5). In 3 babies infection was recorded during stay in hospital but they recovered and were discharged back to KMC room. All the babies were breast fed. The stay in hospital for maximum babies is about a week.

Table 5: *Comparison of mortality of preterm in KMC and neonatal unit. (121).*

Duration	Total Preterm Deliveries	Shifted to Nursery	# of Mortalities	%age	# of Mortality in KMC
1-Aug 16 – 31-Jan 17	290	129	38	29.4%	0

In 2010, World Health Organization strongly endorse proposal of more comprehensive KMC to be practiced worldwide. All of the available evidence supports KMC as not just an alternative treatment for LBW infants in low-income areas of the world but as an important component in infant development⁽²⁾.

There was study conducted in America (Broughton El, et al, 2013) examined the costs of implementing KMC in a referral hospital in Nicaragua, including

training, implementation and ongoing costs and economic impact on health system. They took 46 randomly selected preterm neonates before implementation and were compared with 52 neonates after implementation. They found that neonates after implementation had lesser hospital stay by 4.64 days and 71% exclusively breastfed. The intervention cost US\$ 23,113 but the money saved with shorter hospital stay, elimination of incubator use and lower antibiotic and infant formula cost made for 1 – 2 months. Extending KMC to 12 other facilities in Nicaragua is projected to save approximately US\$ 233,000 after one year. ⁽¹⁶⁾

KMC is a good, safe and economical alternative to provide preterm care in developing countries. It is well accepted by mothers, families and nurses. Additional advantages being of, higher incidence of breast-feeding, and lower incidence of serious infections.

Taking kangaroo mother care project forward in Punjab

Twenty-six per cent of babies in Punjab are classified at birth as low birth weight putting them at greater risk of dying due to hypothermia and feeding problems.

KMC is a good, safe and economical alternative to provide preterm care in developing countries. It is well accepted by mothers, families and nurses. Additional advantages being of, higher incidence of breast-feeding, and lower incidence of serious infections.

Kangaroo mother care team along with UNICEF is working on removing bottlenecks and barriers in newborn health care in hospitals. They developed a structured programme include training, workshops, supportive supervision, and helping to establish the necessary links between hospital-based neonatal units, primary healthcare facilities, district-based health staff and community-based organizations, all of which can potentially greatly enhance the neonatal care and help in expansion of KMC project to all areas of Punjab.

Conclusions

In babies less than 2.5 kg and gestational age less than 37 weeks, prolonged skin-to-skin and exclusive breast-feeding prevents baby from infections and hypothermia. Hence neonatal morbidity and mortality is reduced. However KMC is limited in low income

countries. If KMC were to reach high coverage areas through implementation at lower level of health system, the annual number of deaths due to prematurity is markedly reduced.

Authors Contribution

Noreen Rasul: Primary author.

Madeeha Rashid: Data and result analysis and discussion.

Aqeela Abbas: Data collection.

Rubina Sohail: Supervisory role in conduct of research editing of manuscript and due of research plan.

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