

Original Research Article

Kangaroo mother care in COVID-19 pandemic, accepting the new normal

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ABSTRACT

Background: Kangaroo mother care is an evidence-based, low cost and high impact approach that has shown significant reduction in preterm mortality. Practising KMC in COVID 19 era, is a challenge for mothers and the NICU's. Aim of the study was to assess the effect of this pandemic on the practice of KMC in our NICU and opine about the possible barriers.

Methods: It was a retrospective observational cohort study. Data was collected from the NICU records. Neonates fulfilling the inclusion criteria were classified as pre COVID-19 epoch (January 2020 to March 2020) and post COVID-19 epoch (April 2020 to June 2020). KMC hours provided were compared between the two groups.

Results: Forty-six neonates were included in epoch 1 and Forty-two in epoch 2. Outcomes were analysed between the groups for primary measures, cumulative KMC hours reduced significantly in after COVID-19 period compared to the other group (median of 2 hours v/s 17 hours respectively), p value<0.001. Similarly, time to introduce first feeds increased from 6 hours in epoch 1 to 12 hours in epoch 2, p value=0.004.

Conclusions: COVID-19 pandemic has affected the duration of KMC inside the NICU. Lack of clear guidelines/training about continuing KMC in COVID times has further lead to decrease in KMC duration as reported in the present study. Training and awareness regarding the benefits of KMC which outweigh its possible risks and proper sanitization and hand hygiene for both healthcare providers and KMC providers need to be enforced to continue this good practice in the NICU's and the community.

Keywords: Preterm, Kangaroo mother care, COVID-19 pandemic, Barriers to KMC

INTRODUCTION

Prematurity is a global health issue. Over Fifteen million preterm births occurring each year, and over 1 million of these preterm infants dying.¹ Countries with highest rates of preterm births range throughout all types of income strata i.e. from high to middle to low-income countries. Those that are high-income, includes the USA, middle-income such as India, China, the Philippines, Indonesia and Brazil, and low-income such as Nigeria, Pakistan, Bangladesh, Democratic Republic of Congo. Thus, interventions such as early KMC to reduce mortality and other prematurity related problems in such babies, that are

feasible and applicable in both high- and low-income settings are highly desired.¹

Kangaroo mother care (KMC) is an evidence-based, low-cost approach which has a very high impact in reducing mortality and morbidities in preterm infants. It is a useful intervention in a resource limited setting. KMC program was first developed in 1979 by physicians Edgar Rey Sanabria and Héctor Martínez-Gómez in Bogotá, Colombia, as an alternative to conventional incubator treatment for low birth weight infants.² According to the WHO, KMC consists of prolonged skin-to-skin (STS) contact between mother and infant, exclusive breastfeeding whenever possible, early discharge with

adequate follow-up and support, and initiation of the practice in the facility and continuation at home.³ In a meta-analysis published in the Cochrane library it was found that KMC significantly reduces mortality in preterms to a tune of 40% and further improvement in other outcomes such as severe infection/sepsis, emotional attachment in mothers, and weight gain versus conventional neonatal care in preterm infants.⁴ KMC is a cost-effective method for treating preterm infants, that mothers who have practiced KMC may find it acceptable, and that KMC can have a positive impact on the health of mothers in certain cases.⁵⁻⁸ Therefore, KMC is a highly relevant intervention that should be promoted in various settings across the world.

Practicing KMC is often challenging. Various barriers have been identified in the literature which may hinder the effective delivery of KMC. These include pain and fatigue, logistic issues (baby too difficult or heavy to hold, discomfort on the chest or back, and exhaustion, among others like positioning issues). Mothers' medical issues also pose a major barrier which makes the practice of continuous KMC challenging, especially those who have low motivation and medical issues. Amongst the NICU staff, barriers include increased workload, presence of sick neonates, low awareness, lack of clear guidelines, inexperience, lack of belief in efficacy.⁹

The COVID-19 pandemic originated in the China in December 2019.^{10,11} The virus spread rapidly and by March 2020 over 100 countries were affected. Owing to the high contagion and fatality rate of the virus and the WHO declaration of COVID-19 as a pandemic, routine medical care was impacted and consequently the rate of KMC may have also suffered. Clinical evidence shows KMC is effective in improving the newborns neurodevelopmental outcomes, stabilization of preterm newborns physiological function and reduction in maternal distress following the birth.¹² Recently, the WHO recommended that mothers and newborns should not be separated. The dyads should enable the practice of KMC even in cases of suspected or confirmed COVID-19 by using personal protective equipment and the disinfection of used surfaces. The WHO also urges clinicians, midwives and policy makers to keep neonatal care at the frontline, and as such consider KMC in the neonatal wards, with the use of all related precautions.¹³ Practising KMC in COVID-19 era, is a challenge. The hypothesis of our study is that COVID-19 has not affected the duration of KMC in preterm babies in our unit. We want to assess the effect of COVID-19 pandemic on the practice of KMC in our NICU and opine about the possible barriers at this time.

METHODS

Patients and setting

This was a retrospective observational cohort study performed at NICU of KEM Hospital, Pune, India. This is

a tertiary care Level III NICU, with a yearly admission rate of approximately 900 neonates. Neonates with birth weight less than 1500 grams were included in the study from January 2020 till June 2020.

The period was divided in two groups January 2020 to March 2020 as the first group and April 2020 till June 2020 as the second group as the nationwide lockdown for COVID-19 pandemic came into force from 25 March 2020.

Data collection

The data records were collected for the NICU patients during the study period. Patient admission register was searched for the admissions. All the eligible neonates were identified and their patient files were searched for from the central medical records office in the hospital. All clinical, laboratory and demographic data were obtained from the past records of the patients.

Inclusion criteria

Data records of the neonates less than 1500 grams birth weight were included in the present study.

Exclusion criteria

Neonates with congenital anomalies, death before discharge, discharged against medical advice were excluded from the study.

Outcomes

Primary outcome was to find out the effect of COVID-19 pandemic on the mean/median duration of KMC in the NICU. Secondary objectives were to delineate the effect of COVID-19 pandemic on the time to start first feeds, on the incidence of various comorbidities like sepsis, PDA, IVH, BPD and NEC.

Statistical analysis

The data were collected using google forms and exported subsequently to Microsoft excel sheet version 1910, and analysis was done by using IBM SPSS version 24. Continuous variables were presented as mean±standard deviation in normal distribution and median and interquartile range in skewed distribution. Categorical variables were expressed in frequency and percentages.

Continuous variables were compared between two groups i.e. before COVID-19 and after COVID-19 by performing independent t-test for normalised data and Mann-Whitney test for non-normalised data. Categorical variables were compared by chi-square test.

For small numbers, Fisher's exact test was used wherever applicable. P<0.05 was considered statistically significant.

RESULTS

Baseline characteristics of the study population

A total of 396 neonates were admitted to the NICU during the study period, 245 before COVID-19 group and 151 after COVID group. Forty-six babies in epoch 1 and 42 babies in post COVID-19 (epoch 2) fulfilled the inclusion criteria in before and after COVID-19 groups respectively. Mean gestational age and birth weight were comparable in both the groups. Sex distribution was also similar. Incidence of maternal anaemia, rate of caesarean section, coverage of antenatal steroids, need of resuscitation was distributed equally among both the comparison groups. There was no difference in the incidence of PPRM, PIH, GDM, doppler abnormality amongst the groups (Table 1).

Outcomes

When outcomes were analysed between the groups for primary measures, cumulative KMC hours reduced significantly in after COVID-19 period compared to the other group (median of 2 hours v/s 17 hours respectively). Similarly, time to introduce first feeds increased from 6 hours in epoch 1 to 12 hours in epoch 2.

When other outcome measures were analysed, there were no differences observed in the rates of BPD, hemodynamically significant PDA, IVH, Culture positive sepsis and NEC. Duration of hospital stay and discharge weights were similar in the groups (Table 2).

Table 1: Baseline variables in two groups.

	Before COVID-19 Epoch 1 (January-March) N (%)	After COVID-19 Epoch 2 (April-June) N (%)	MD or RR (95% CI)
Total admissions	245	151	
No. of babies	46	42	
Gestational age weeks, Mean±SD	29.78±2.6	30.69±2.15	MD- 0.91 (-1.92 to 0.10)
Mean birth weight, Mean±SD	1198.52±395	1243.6±200	MD- 45 (-179.7 to 89.5)
Males	30 (65.2)	21 (50)	0.53 (0.22-1.25)
Maternal anaemia	7 (15.2)	7 (16.7)	1.11 (0.35-3.49)
LSCS	37 (80.4)	36 (85.7)	0.68 (0.22-2.12)
SGA	30 (65.2)	28 (66.7)	1.06 (0.44-2.57)
Resuscitation as bag and mask and above (yes)	11 (23.9)	12 (28.6)	1.27 (0.49-3.29)
Antenatal steroids	36 (78.3)	31 (73.8)	0.78 (0.29-2.09)
PPROM	18 (39.1)	13 (31)	0.69 (0.29-1.68)
PIH	15 (32.6)	17 (40.5)	1.4 (0.58-3.36)

Table 2: Outcomes in the two groups.

	Before COVID-19 Epoch 1 (January-March) N (%)	After COVID-19 Epoch 2 (April-June) N (%)	P value or RR (95% CI)
BPD	5 (10.9)	4 (9.5)	0.86 (0.21-3.45)
PDA	13 (28.3)	13 (31)	1.13 (0.45-2.84)
IVH	4 (8.7)	8 (19)	2.47 (0.68-8.90)
Culture positive sepsis	5 (10.9)	3 (7.1)	0.63 (0.14-2.81)
NEC	4 (8.7)	3 (7.1)	0.80 (0.17-3.84)
Discharge Weight grams, Mean±SD	1643.54±334.5	1471±418	0.08
KMC hours (cumulative), median (IQR)	17 (11-32)	2 (0-14)	<0.001
Time to start feeds (hours), median (IQR)	6 (1-24)	12 (8-29)	0.004
Hospital stay days, median (IQR)	20 (15-35)	29 (14-57)	0.21

DISCUSSION

KMC is a low resource, evidence based, high impact intervention and standardised care for low birth weight infants which, like breastfeeding, should be part of routine care. It can prevent up to half of all deaths in infants weighing <2000 gm.¹⁴ KMC is a simple method of care for low birth weight infants that include comprises of early and prolonged skin-to-skin contact and exclusive and frequent breastfeeding.¹⁵ This stabilizes body temperature, promotes breast feeding, prevents infection and other morbidities. This also leads to early discharge, better neurodevelopment and encourages bonding between mother and infant.¹⁶ KMC is initiated in the hospital and continued at home until the infant needs it and for optimum care a regular follow-up must be ensured.¹⁷ WHO recommends skin-to-skin care immediately after delivery for every new-born, irrespective of the birth weight to ensure warmth and early initiation of breast feeding in the delivery room.¹⁷ Evidence of the effectiveness and safety of KMC for clinically stable preterm neonates, is now formally established. Cochrane review published in 2016 analysed 21 studies.⁴

KMC was associated with a statistically significant reduction in the risk of mortality, nosocomial infection/sepsis, and hypothermia. At latest follow-up, KMC was associated with a significantly decreased risk of mortality and severe infection/sepsis. Moreover, KMC was found to increase weight gain MD=4.1 g/d, 95% CI 2.3 to 5.9, length gain (MD=0.21 cm/week, 95% CI 0.03 to 0.38) and head circumference gain (MD=0.14 cm/week, 95% CI 0.06 to 0.22) at latest follow-up, exclusive breastfeeding at discharge or 40 to 41 weeks' postmenstrual age and at one to three months' follow-up, early-onset KMC versus late-onset KMC in relatively stable infants reported no significant differences between the two study groups in mortality, morbidity, severe infection, hypothermia, breastfeeding, and nutritional indicators. Early-onset KMC was associated with a statistically significant reduction in length of hospital stay.⁴

Practising KMC is a difficult task. Furthermore, practice of KMC is bound to be affected during COVID-19 era when situations require to maintain social distancing and less physical contact in our day to day lives. In our study we have analysed the effect of COVID-19 pandemic and lockdown restrictions on the practice of KMC in our NICU. We could document the effect of this pandemic on the practice of KMC by observing cumulative hours for which babies were given KMC before and after the restrictions. Our data suggested a significant reduction of cumulative KMC hours from a median of 17 hours to 2 hours in post COVID-19 era. Baseline characteristics were similar in both the groups which further strengthens the evidence. A systematic review by Seidman et al in 2015 identified barriers to the implementation of KMC.⁹ They included limitation of the resources and environment of the facility. Others were negative staff attitudes or

interactions. Fear/anxiety of hurting the infant was also a major contributor. In the context of the present study, the above-mentioned barriers are valid in COVID-19 era as the pandemic has further stretched limited resources including availability of staff inside the NICU. Attitude of KMC providers has taken a downhill as they are now worried about viral transmission from the KMC provider and requirement of social distancing which has resulted in less interaction amongst them. Concern about harming the baby by transmitting virus has decreased motivation of KMC providers which might have affected KMC duration in the present study.

According to the meta-analysis, resource related barriers that are relevant both inside and outside the facility were lack of help with KMC practice and other obligations and Low awareness of KMC/infant health.⁹ In the COVID-19 times, these two barriers are very important as awareness that KMC will benefit the neonates is still limited and there will be more harm than benefit if KMC practice is reduced. Resourcing and sociocultural factors emerged as the top barriers to KMC adoption for nurses in the meta-analysis by Seidman et al.⁹ The resourcing barriers were increased workload/staff shortage which is very relevant in the context of present study as during our study period 40% staff nurses were either on leave or left the jobs which adversely affected our KMC hours. Lack of clear guidelines/training about continuing KMC in COVID-19 times has further led to decrease in KMC duration as reported. The sociocultural barriers general lack of buy-in/belief in were another barrier for nurses in the meta-analysis which were valid for our study as there was lack of knowledge that KMC is still effective and a very valid intervention in present scenario.

COVID-19 related measures can be considered as major barrier to the implementation of KMC practice. Possible explanations include fear amongst mothers regarding the spread of infection to the baby with skin-to-skin contact, fear and hesitance among healthcare providers to continue KMC in times of uncertainties like these when they have to maintain social distancing with the providers of KMC for the fear of possible transmission of SARS-CoV2, lockdown restrictions implemented by the authorities to prevent the community spread of the virus. There is also fear amongst the providers of KMC about contracting the virus while in the hospital and visiting too frequently or staying in postnatal maternal ward for providing KMC which was the standard practice before COVID-19 era. Other barriers could be stress related factors added due to sickness of the neonate, policies of the hospital regarding practice of early skin to skin contact and KMC, and unavailability of routine screening for the virus.

Practice of KMC needs to be continued now more than ever considering its benefits which significantly outweigh the risks.¹⁸ Moreover, in condition of lack of evidence of transmission of virus during KMC and breastfeeding, these good practices need to be continued by applying recommended hygiene measures, consisting of wearing

surgical-mask, hand washing, and using alcohol-based solutions to clean the surfaces. One report has suggested no transmission of the virus from a COVID-19 positive mother during KMC which was given taking standard precautions.¹⁹ Mothers and caregivers need to be motivated to continue giving KMC. In the light of limited evidence against the practice, WHO recommends that all mothers with confirmed or suspected COVID-19 continue to have skin-to-skin contact and to breastfeed. Skin-to-skin contact, including kangaroo mother care, reduces neonatal mortality, especially for low birth weight new-borns.

While infants and children can contract COVID-19, they are at low risk of severe infection. WHO's recommendations on the KMC and feeding of infants whose mothers have confirmed or suspected COVID-19 aim to improve the immediate and lifelong survival, health and development of their new-borns and infants. These recommendations consider the likelihood and potential risks of COVID-19 in infants and also the risks of serious illness and death when infants are not breastfed or when infant formula milk are used inappropriately.²⁰ A recent study published in *Lancet* states that the survival benefit of KMC far outweighs the small risk of death due to COVID-19. Preterm newborns are at risk, especially in LMICs where the consequences of disruptions are substantial. Policymakers and healthcare professionals need to protect services and ensure clearer messaging to keep mothers and newborns together, even if the mother is SARS-CoV-2-positive.¹⁸

The strengths of this study are it's first of its kind highlighting potential negative impact of COVID pandemic on KMC. Our study highlights a major concern about practice of KMC and its implementation on post COVID era.

Limitations

Limitations include that our study was a retrospective study and overall, less cumulative KMC hours in pre-COVID epoch. Sample size was small so the study was not adequately powered. The study only highlights the potential reasons for decrease in KMC duration. We could not interview mothers and other family members to investigate causes of anxiety amongst them. Caretakers including NICU staff and doctors were unable to adequately express their concerns on the issue because of the busy schedule due to shortage of healthcare providers in light of the COVID-19 pandemic.

Training and awareness of healthcare providers and KMC providers to continue implementation of KMC in post COVID-19 era. Myths about the modes of virus transmission needs to be busted by proper training sessions. Support staff are needed to continue routine implementation of KMC in NICU and community setting and a quality improvement to improve uptake of KMC and breastfeeding is need of the hour.

CONCLUSION

COVID-19 pandemic has affected the duration of KMC inside the NICU. Lack of clear guidelines / training about continuing KMC in COVID-19 times has further lead to decrease in KMC duration. Training and awareness regarding the benefits of KMC and proper sanitization and hand hygiene for both healthcare providers and KMC providers need to be enforced to continue this good practice in the NICUs and the community.

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