

Original Article

A Hospital-Based Study to Assess the Effect on Mental Health of Mothers providing Kangaroo Mother Care (KMC) to Newborns

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ABSTRACT

Background: Many mothers with low-birth-weight babies and sick babies present with mental health issues. Kangaroo mother care (KMC) aims at skin-to-skin contact between the care provider and newborn babies. KMC provides psychological support to the mother and helps her positively interact with the baby. **Method:** This present cross-sectional observational study assessed the mental health of 40 KMC mothers according to the DASS-21 questionnaire. Mothers filled the questionnaire before the start of KMC and after 7 days of continuing Kangaroo care sessions. The questionnaire assessed the mental health on three different parameters: stress, anxiety and depression. Both the baseline and follow-up scores were computed, and the data were analysed. **Results:** There was a significant reduction in scores of stress, anxiety and depression over 7 days of KMC sessions. **Conclusion:** Kangaroo Mother Care supports bonding and interaction between mothers and babies. The mental health of mothers improves after KMC sessions.

Key words: Kangaroo-Mother Care Method, Low Birth Weight Infant, Mental Health, Mother, Depression, Anxiety

The perinatal period includes various physiological and psychological changes regarding the development of the foetus, also the adapting bodily functions of women lead to changes plasticity of brain during and post pregnancy [1]. Clinical conditions of baby hamper the mental well-being of mothers. 40% of mothers with less gestational age and low birth weight babies were brought up with ill mental health at later times [2]. A highly anxious mother during the hospital stay, till some extent may not raise the child efficiently. This results in decreased efficacy in the parenting capabilities of mothers till the kindergarten age of the child [3].

Kangaroo Mother Care (KMC) is inspired by the way marsupial animals care for their young. The three essential components of KMC are positioning, feeding, and discharge [4]. Kangaroo positioning specifically focuses on maintaining skin-to-skin contact between the infant and mother, which can be continued for up to 24 hours a day. The infant is placed in an upright position between the mother's breasts, against the chest. The mother thus functions as a 'human incubator' for her babies. This provides psychological stability to the mother and also prevents reflux and aspiration for the baby [5].

KMC includes various changes in technique, such as exclusive or limited breastfeeding, feeding from mother's milk, or formula milk. It also includes changes in skin-to-skin

exposure of various body parts of the baby, or the time duration of KMC sessions, ranging from 1 to 24 hours per day. KMC can be employed either by including its early hospital discharge element or not [6]. A mother has a reduced chance of postpartum depression (PPD). KMC for preterm and low-birth-weight babies results in improved breastfeeding outcomes and more positive attachment and bonding. KMC cushions the baby from the harsh environment of the neonatal intensive care unit. It enables parents to nurture their baby by actively caring for them. KMC also increases interaction with parents, which may have been reduced due to the infant's clinical condition [7].

Apart from being remedial to resource scarcity and physiological instability in infants, KMC is a promising factor on maternal stress, anxiety, and depression. KMC improved the behaviour of the anxious mother and helped her to interact with her surroundings in a positive way [8]. The adverse consequences leading to maternal anxiety, such as ailments of the baby and the code of conduct of the Neonatal ICU, are also seen to be reduced. When a baby is brought into close skin-to-skin contact with the mother, sensory stimuli are elicited, which in turn uplifts the mother's mood [9]. This, furthermore, contributes to the formation of a very strong bond between parent and child [10]. KMC also helps parents accept their baby's clinical condition and, in turn, increases their trust in the treatment provided by paediatricians [11].

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MATERIALS AND METHODS

Study population and design

The present cross-sectional (observational) study was conducted at a Neonatal ICU (NICU) in a central India-based Tertiary Care Hospital for 2 months. The study population is all the mothers of low birth weight (LBW) babies (less than or equal to 2,500 grams) and very low birth weight (VLBW) babies (less than or equal to 1,500 grams) providing KMC (kangaroo mother care) at the NICU.

Sample size

Sample size $N = 4pq/E^2$

p- prevalence = 17.29%; q = 1-p; E- margin of error = 5%

upon calculating

$n = 220$

for 2 months

$n = 220/6 = 37$

if dropout rate is assumed to be 10%

$n = 37 + 10\%$

$n = 40$

Inclusion criteria: All the mothers of infants with birth weight <2500gms providing kangaroo care

Exclusion criteria: Mothers refusing consent to participate in the study, and earlier been diagnosed with mental health disorders such as schizophrenia and on treatment for affect disorders

Procedure: The day of the start of KMC was taken as Day 0, and just before the start of KMC mother was asked to answer the DASS-21 questionnaire for which baseline scores were calculated. Another relevant information, such as the time of start of KMC concerning the baby's day of life, the weight of the baby before starting KMC, Time spent on KMC, was documented. At Day 7, the mother was asked to answer DASS-21 again, and final scores were computed along with average duration spent per day and the final weight at Day 7.

Data collection tools

The tool for assessment of the Mental health of the mothers used was DASS-21. The Depression, Anxiety and Stress Scale - 21 Items (DASS-21) estimates the emotional states of depression, anxiety and stress. It is a self-report questionnaire to assess general psychological distress. Each of the three DASS-21 scales contains 7 entities, divided into three subscales with comparable content. The subscales are inclusive of DASS-D, DASS-A, and DASS-S, the depression, anxiety, and stress scale, respectively. The depression (DASS-D) scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia and inertia. The anxiety (DASS-A) scale evaluates autonomic arousal, skeletal

muscle effects, situational anxiety, and subjective experience of anxious affect. The stress (DASS-S) scale is liable to levels of chronic nonspecific arousal. It estimates the difficulty relaxing, nervous arousal, and being effortlessly upset/agitated, irritable and over-reactive. Scores for depression, anxiety and stress were computed by adding up the scores for relevant item and multiplying by 2 for computing the final scores [13]. Final scores were then assessed according to the recommended cut-off scores for established severity of the mental health disorders (normal, moderate, severe, extremely severe) tabulated below (Table 1).

Table 1: Cut-off scores for severity according to the DASS-21 questionnaire

	Depression	Anxiety	Stress
Normal	0 – 9	0 – 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Moderate	14 – 20	10 – 14	19 – 25
Severe	21 – 27	15 – 19	26 – 33
Extremely Severe	28 +	20 +	34+

Patient safety concerns

KMC mothers marked by extremely severe scores according to DASS-21 cut-off scores were referred to the department of psychiatry for further Psycho clinical evaluation and management.

Quality control

The present study includes DASS-21 in English and Hindi. Sharma's translation of the DASS-21 is used for the Hindi questionnaire. The items are in the same order as the English DASS [14]. DASS-21 consist of good internal consistency. The Cronbach's alpha values are 0.85 for DASS-D, 0.81 for DASS-A, and 0.81 for DASS-S. The reliability factor for DASS-21 (DASS subscales intercorrelate strongly) is an r value greater than or equal to 0.80. Good validity is seen for DASS21 in India [15].

Ethical considerations

The present study was reviewed by the Institutional Ethics Committee, and confidentiality of the mother during data processing was maintained

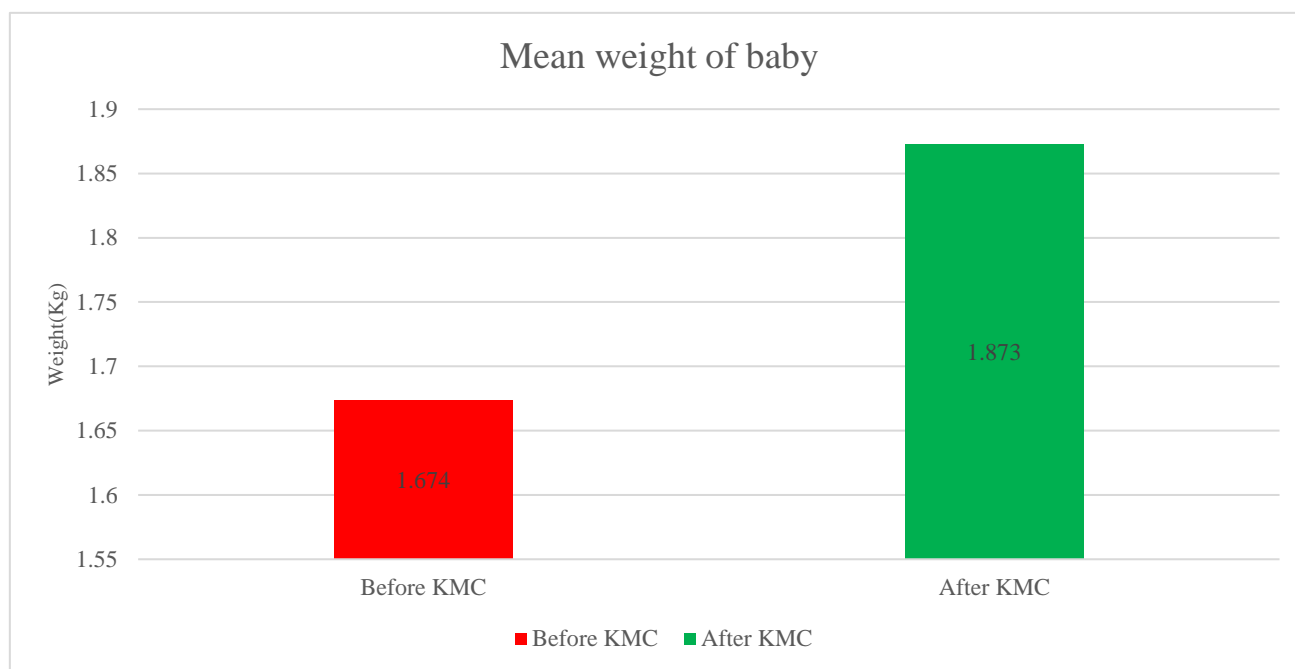
RESULTS

For statistical analysis, IBM SPSS Software (Version 27) was used. The tests of significance used were Student t-test, Pearson coefficient and paired correlation. The level of significance was chosen to be $p < 0.05$. Final data is shown in the form of tables, graphs and pie charts.

Over 2 months, 52 neonates were suggested for KMC at NICU, out of which 6 (11.5 %) mothers dropped out due to consent refusal and transfer of neonate to another hospital, 2

neonates died, and 4 (7.69 %) mothers were referred to the psychiatry department for declined evaluation. The remaining 40 mothers were included for their mental health scores assessment. 30 neonates (75 %) were LBW (body weight less than or equal to 2,500 grams) and 10 neonates (25 %) were

VLBW (body weight less than or equal to 1,500 grams). The mean weight of the baby before the start of KMC was 1.674 grams, and the mean weight after KMC was 1.873 grams (Graph 1).



Graph 1: Average weight of baby before and after KMC

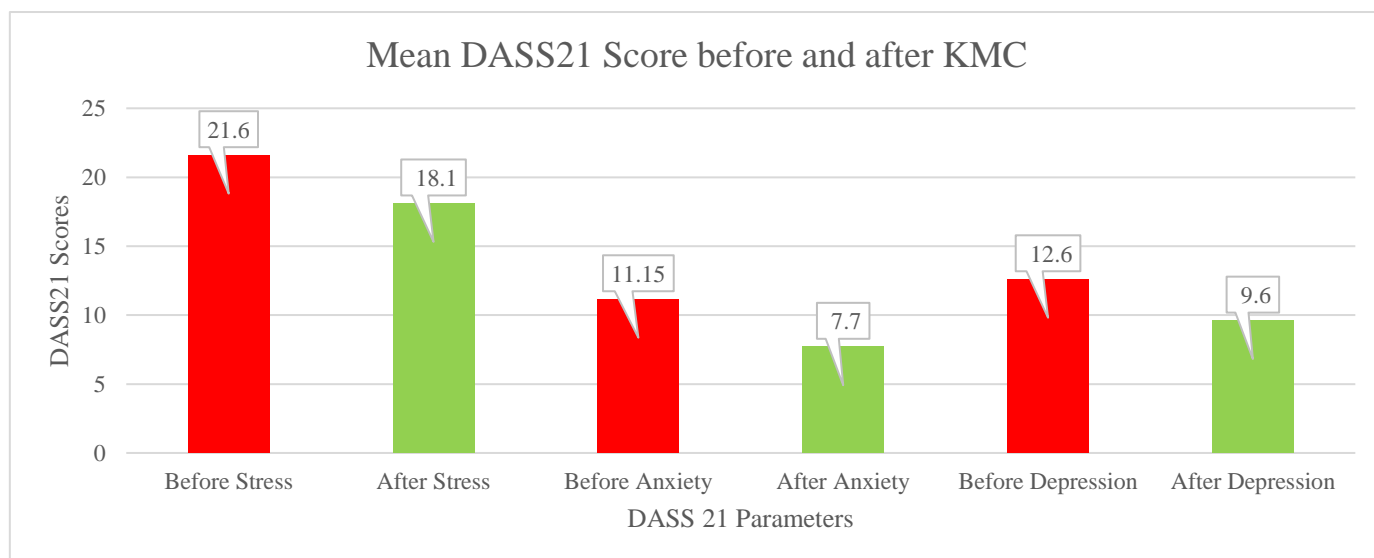
The mean of anxiety scores before KMC was 11.15 ± 4.833 , rated moderate according to DASS 21 cut-off values (10-14). The mean post-KMC score was 7.70 ± 5.155 , which was rated mild (8-9). The mean differential between the mean values of anxiety scores is 3.45, which shows a statistically significant anxiety reduction (Table 2). Similarly, the depression scores also showed a statistically significant reduction ($p < 0.001$). The mean score before KMC is 12.60 ± 4.903 (mild) and after KMC is 9.60 ± 5.207 (normal to mild), with a standard deviation among scores before and after, respectively (Table 2).

The mean stress score before KMC was 21.60 ± 5.856 , which according to DASS severity rated moderate (19-25) compared to the post-KMC stress score of 18.10 ± 4.199 , which was rated mild (15-18) after one week, respectively. The mean difference between the mean values of stress scores before and after KMC and the difference between the stress scores before and after KMC are statistically significant ($p = 0.003$) (Table 2). Combined mean DASS-21 scores before and after KMC revealed an improvement in various domains (Stress, anxiety, and depression) as shown in Graph 2.

Table 2: Comparison of DASS-21 scores before and after KMC

KMC	N	Mean	Std. Deviation	95% confidence interval of the mean		Mean difference	t-test value	P value
				Lower	Upper			
Before Stress	40	21.60	5.856	19.73	23.47	3.50	3.22	0.003*
After Stress	40	18.10	4.199	16.76	19.44			
Before Anxiety	40	11.15	4.833	9.60	12.70	3.45	4.36	<0.001**
After Anxiety	40	7.70	5.155	6.05	9.35			
Before Depression	40	12.60	4.903	11.03	14.17	3.00	4.69	<0.001**
After Depression	40	9.60	5.207	7.93	11.27			

*indicates statistical significance ($p \leq 0.05$); ** indicates highly statistical significance ($p \leq 0.001$).



Graph 2: Comparison of DASS21 Scores before KMC and after KMC

The correlation between anxiety, with time and duration, is provided below (Tables 3, 4, and 5). A moderate positive correlation was found for anxiety and depression before and after KMC, with statistically significant differences ($p = 0.001, 0.003$, respectively). However, stress before and after showed a very weak positive correlation with no statistically significant difference ($p = 0.549$) (Table 3).

Table 3 Correlation of DASS-21 SCORE PRE KMC-Parameters & DASS21 SCORE POST KMC Parameters

Paired Correlation	N	Pearson Correlation coefficient	P value	Remark
Stress Before & Stress After	40	0.098	0.549	Very weak positive Correlation and statistically insignificant
Anxiety Before & Anxiety After	40	0.500	0.001**	Moderate positive Correlation and statistically significant
Depression Before & Depression After	40	0.451	0.003*	Moderate positive Correlation and statistically significant

*indicates statistical significance ($p \leq 0.05$); ** indicates highly statistical significance ($p \leq 0.001$).

Similarly, the correlation between DASS-21 scores before KMC and the start time of KMC was assessed. A weak, moderately positive correlation was noted between the time of start and stress, as well as anxiety, with statistically significant differences noted for later ($p = 0.026$). Similarly, a weak positive correlation that was not statistically significant was noted between time of start and depression ($p = 0.053$) (Table 4).

Table 4. Correlation of DASS-21 SCORE PRE KMC-Parameters of Stress, Anxiety and Depression & time of start (Days) of KMC

Paired Correlation	N	Pearson Correlation coefficient	P value	Remark
TIME OF START & Stress	40	0.311	0.051*	Weak, moderately positive Correlation and statistically insignificant
TIME OF START & Anxiety	40	0.263	0.026*	Weak, moderately positive Correlation and statistically significant
TIME OF START & Depression	40	0.309	0.053*	Weak positive Correlation and statistically insignificant

*indicates statistical significance ($p \leq 0.05$)

Correlation between DASS-21 score post KMC and average duration is provided in Table 5. Duration of KMC, stress and depression had low, moderate and weak positive correlations, respectively, with no statistically significant differences ($p = 0.853$ and 0.402 , respectively). However, the duration of KMC and anxiety had a weak positive correlation, which was statistically significant ($p = 0.014$)

Table 5. Correlation of DASS-21 SCORE POST KMC-Parameters of Stress, Anxiety and Depression & Average Duration of KMC (hrs.)

Paired Correlation	N	Pearson Correlation coefficient	P value	Remark
Duration of KMC & Stress	40	0.30	0.853	Low Moderate positive Correlation and statistically insignificant
Duration of KMC & Anxiety	40	0.385	0.014*	Weak positive Correlation and statistically significant
Duration of KMC & Depression	40	0.136	0.402	Weak positive Correlation and statistically insignificant

*indicates statistical significance ($p \leq 0.05$)

DISCUSSION

Postpartum stress disorder has many ill effects on the mother as well as the infant. It may cause anxiety, depression a sense of isolation for the mother and poor bonding between the mother and the child [16]. KMC, along with being the cheapest, most reliable and widely accepted intervention reducing infant mortality and morbidity, is also proven to reduce maternal depression [17]. The present study aimed at assessing the effect of kangaroo mother care on the mental health of mothers according to three different parameters: stress, anxiety and depression. The mean stress according to DASS-21 was reduced from moderate to mild in KMC mothers within 7 days. This finding is also consistent with Zych B and Schappin R, which indicate a remarkable reduction in stress among parents regarding the baby, arising due to diagnostic and therapeutic procedure for the infant inside the NICU [18, 19].

KMC increases maternal satisfaction regarding the interventions in the ICU and hence reduces stress [20]. In our opinion, KMC is an integrated approach that helps mothers to counteract the stress during the perinatal period. Hectic NICU environment, uncertainty about the infant's prognosis and multiple visits of the healthcare providers significantly affect the autonomic function [21].

Among KMC mothers assessed, anxiety reduced from moderate to mild seven days after KMC. In some of the cases, depression was reduced from mild to normal, and some cases showed a very little improvement in depressive symptoms. Various physiological and emotional responses after giving birth to a preterm and low birth weight baby may evoke depressive symptoms in the mother [22]. After a KMC session mother showed a positive sense of feeling, was calmer, happy, energetic and more relaxed [23]. Reduced symptoms of anxiety were seen among women providing KMC to their babies [24].

Our study was also consistent with de Macedo *et al.* reporting mood changes among mothers and reduced maternal depression and anxiety [23]. Low-weight and preterm babies make mothers more anxious. By applying KMC at the earliest, mother and baby contact is facilitated in a normal way, leading to increased confidence among care providers [25]. In a randomised control trial conducted by Doroty Vintner and colleagues concluded that oxytocin and cortisol were released

during skin-to-skin contact, reducing parental anxiety and depression [26].

The present study hypothesised on a reduction in stress, anxiety and depression scores after 7 days of KMC and increased weight and physiological stability of the infant. All significant findings support this hypothesis, leading to the conclusion that KMC remarkably reduce stress and anxiety, and a little reduction is seen in depression. The correlation between the time of start of KMC concerning the baby's day of life and scores of stress, anxiety and depression before and after 7 days of KMC was also observed. The pre-KMC scores and the time of start of KMC correlated significantly. According to the guidelines, KMC intervention is started as soon as the infant is stable in the ICU. In our observation, KMC was started in the second week of life due to the sick newborn, which led to hampered interaction of the mother with the infant, resulting in emotional distress and anxious behaviour of the mother [27, 28]. Also, the time of start of KMC correlated with stress and anxiety scores after KMC. This is due to increased work done by the mother in terms of long sitting hours, decreased mobility, increased interaction with the infant resulting in stress regarding the feeding pattern,

Hectic NICU environment during the initial days after the start of KMC. The average hours spent during KMC per day and anxiety scores after the KMC also correlated significantly. The reliability of these findings can be decreased by factors such as ongoing medications of the mother, past obstetric history of the siblings, and any major illness to the mother, such as Diabetes, Hypertension and thyroid disorders.

CONCLUSION

The present study concludes that Kangaroo mother care, which includes kangaroo positioning and exclusive breastfeeding at the NICU, results in improved mental health of mothers providing the kangaroo care, catering to reduced stress, anxiety and decreased chances of developing postpartum depression.

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