Original Article

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Community Section

Knowledge about Kangaroo Mother Care among the Mothers and Grandmothers- A Cross-sectional Study in a Neonatal Follow-up Clinic of a Tertiary Care Hospital in Tamil Nadu, India

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ABSTRACT

Introduction: Kangaroo Mother Care (KMC) is a simple method of caring Low Birth Weight (LBW) babies with a birth weight below 2500 grams. The grandmothers play a key role in child rearing in the Indian society.

Aim: To estimate the level of knowledge about the KMC in the grandmothers and to compare it with that of the mothers.

Materials and Methods: The cross-sectional study was conducted in the neonatal follow-up clinic of a tertiary care hospital with a convenience sampling of all the mother (Group 1) and grandmother (Group 2) dyads. The mothers and grandmothers were interviewed separately using a pre-validated questionnaire with 15 open ended questions to assess the knowledge about the KMC. Mann-Whitney U test and Fischer's-exact test were used for statistical analysis.

Results: There were 390 mother- grandmother dyads in the study group. The mean age of the mothers and grandmothers were 24.69±1.54 years and 53.89±1.80 years, respectively. For all the 15 questions the grandmothers had a significantly lower score when compared to the mothers ($p<0.001$). The grandmothers (mean score: 8.48±2.00) had a significantly lower overall knowledge scores than the mothers (mean score: 23.10±1.55). On comparison of the mean knowledge scores of the mothers with their age, educational status and socio-economic class, it was found to be independent of these factors (p-value=0.209, 0.691 and 0.731, respectively).

Conclusion: This study had demonstrated that the grandmothers have a significantly lower knowledge about KMC. There is an urgent need to empower them with the knowledge about KMC for the successful continuation KMC in the home.

Keywords: Early discharge, Exclusive breastfeeding, Neurodevelopmental outcome

INTRODUCTION

In the year 1978, a team of pediatricians started Kangaroo Mother Care (KMC) in Instituto Materno Infantilin Bogota, Colombia [1]. In 2003, World Health Organisation (WHO) formally endorsed the KMC and published the KMC practice guidelines [2]. KMC is a very simple method for caring the premature and Low Birth Weight (LBW) newborn babies, where the mothers use their own body temperature to keep their baby warm. KMC is very useful for caring LBW babies with a birth weight below 2500 grams. KMC stimulates all the five senses of the neonate. The baby feels the mother's warmth through skin-to-skin contact (touch), listens to mother's voice and her heartbeat (hearing), sucks the breast milk (taste), has eye-to-eye contact with mother (vision) and smells mother's body odour (olfaction) [2]. Though the advantages of KMC are well known, there is lack of interest and resistance to its implementation at various levels in the healthcare system like medical care professionals, mothers and their family members [3,4].

KMC has been described to have two components [2]. The first component is the kangaroo position. After the premature neonate has become stable to lead an extrauterine life, the neonate is positioned on the mother's chest, in upright position and with direct skin-to-skin contact between the mother and her neonate. The second component described is kangaroo nutrition which involves exclusive breastfeeding for the neonate.

KMC has been associated with improved weight gain and better thermoregulation in preterm neonates [5]. It has also been demonstrated to offer benefits to the mother. A study from Haryana showed that the KMC has substantially reduced the risk of postpartum depressive symptoms [6]. A Cochrane review found that neonates who were given KMC had reduced risk of hospital acquired infections, severe illness and respiratory diseases and also had a better weight gain at six months of age than the babies who were given only standard care [7]. Continuing KMC in the homes increases its advantages many times and has become a standard of care for LBW neonates [2]. KMC has also been shown to increase lactation in mother, improve the psychological bonding with the baby and improves sleep cycle and oxygenation in the preterm babies and also reduces the apneic spells [8].

The grandmothers play a key role in child rearing in the Indian society. In Indian communities, irrespective of the religion, the grandmothers, traditionally have significant influence on the decisions related to child health [9]. The knowledge about the child rearing practices among the grandmothers will be a major determinant in reducing the neonatal mortality and morbidity. Further their role is important for the successful fostering of the KMC in the homes after discharge of a LBW baby from the hospital. To the best of our knowledge there are no studies available in the literature as on date that analysed the knowledge level of KMC in the grandmothers. Hence, the aim of this study was to estimate the level of knowledge about the KMC in the grandmothers and to compare it with the mother.

MATERIALS AND METHODS

This cross-sectional study was conducted in the follow-up clinic for LBW and preterm babies in the Government Mohan

Kumaramangalam Medical College Hospital, Salem, Tamil Nadu, India, during the period from October 2020 to March 2021. A convenience sampling of all the mothers attending the follow-up clinic during the study period was done. As per the policy of the hospital, all the mother of LBW babies and their family members are counseled one to one by nurses and doctors at the time of initiation of KMC. Institutional Human Ethics Committee permission was obtained (Ref.No: GMKMC&H/4341/IEC/2019-468).

Inclusion criteria: All the mother and grandmother dyads of graduated babies for whom KMC was given during their stay in the hospital and at their home were included in the study.

Exclusion criteria: The mothers who did not live with their mother or mother-in-law, the grandmothers who were not accessible for interview and the mothers who did not consent for the study were excluded.

Sample size calculation: The sample size for the study was calculated using the below formula: $N=Z^2pq/D^2$. Z is Z score (which is 1.96 for 95% confidence interval), 'p' is prevalence (which is 27%), 'q' is 100-p (which is 73) and D is margin of error (which is 5% with 95% confidence interval). A minimum sample size of 303 was calculated for the study assuming a confidence level of 95%, power of 80%, and prevalence of 27% for LBW in India [2]. But the authors have included all the mothers and grandmothers who fulfilled the inclusion criteria and attended the hospital during the study period.

Procedure

Consent from the mothers was first obtained and they were interviewed first. Their demographic details like age, educational grade, type of family, occupation and socio-economic class were collected. For assessing the socio-economic class, Modified BG Prasad scale was used as the study population had both urban and rural mothers [10]. The biological mother or mother-in-law was selected for interview depending on the place of fostering of the infant at present. The grandmothers who had accompanied the mothers were interviewed after getting their consent on the same day in a separate sitting without the mother. If the grandmothers were not available on that day, they were requested to bring her during the next visit and the dyad was interviewed on that visit. The demographic details of the grandmothers including the age and the educational status were also collected.

The mothers and grandmothers were interviewed separately using a pre-validated questionnaire used in a study by Bajaj S et al., [11]. The questionnaire contains 15 open ended questions. Scores of 0, 1 and 2 are given, respectively for no knowledge, some knowledge and adequate knowledge. The questionnaire was administered by the third author alone to all the participants to avoid interviewer bias.

STATISTICAL ANALYSIS

Data was analysed using Statistical Package for Social Sciences (SPSS) version 24.0. All categorical data were summarised using frequency and percentages, all continuous data were described using mean and standard deviation. To study the difference in knowledge level on KMC between mothers and grandmothers the total knowledge score was compared using Mann-Whitney U test as it violated the normality assumption. Fisher's-exact test was applied to study the heterogeneity in responses between mothers and grandmothers. The p-value was considered significant at 5% level of significance for all comparisons.

RESULTS

After excluding nine mother-grandmother dyads who did not consent citing time constraints, there were 390 mother-grandmother dyads in the study group [Table/Fig-1]. The mean age of the mothers was 24.69±1.54 years and that of the grandmothers was 53.89±1.80 years. Majority (41.54%) of the mothers were in the age group of 21 to 25 years. The study group had 71.8% of the mothers who had educational levels above higher secondary schooling. About

Variable	Number	%
Age of the mothers (years)		
≤20	70	17.95
21-25	162	41.54
26-30	101	25.90
≥31	57	14.61
Educational status		
Uneducated	31	7.95
Primary schooling	10	2.57
Middle and High schooling	69	17.69
Higher secondary schooling	169	43.33
Graduate	89	22.82
Postgraduate	22	5.64
Occupation		
Daily wager	29	7.44
Housewife	281	72.05
Govt service	9	2.31
Self-employed	68	17.43
Private sector	3	0.77
Type of family		
Nuclear	0	0
Extended family	361	92.56
Joint family	29	7.44
Socio-economic class (Modified BG Prasad Scale)		
I (Upper)	191	48.97
II (Upper Middle)	139	35.64
III (Middle)	39	10
IV (Lower Middle)	21	5.39
V (Lower)	0	0
Gestational age (weeks)		
≤31	191	48.97
32-34	128	32.82
≥35	71	18.21
Birth weight (kg)		
<1	29	7.44
1-1.5	209	53.59
1.5-2.5	152	38.97
Age of the Grandmothers (years)		
≤ 50	149	38.20
51-55	129	33.08
56-60	81	20.77
≥ 61	31	7.95
Educational status of grandmothers		
Uneducated	167	42.82
Upto primary school	112	28.72
Upto high school level	111	28.46
More than high school level	0	0

[Table/Fig-1]: Demographic profile of the mothers and grandmothers (n=390 each).

Questions	Mother (n=390)			Grandmother (n=390)			Fischer's-exact test p-value
	No knowledge	Some knowledge	Adequate knowledge	No knowledge	Some knowledge	Adequate knowledge	
What is KMC?	0 (0%)	149 (38.21%)	241 (61.79%)	141 (36.15%)	229 (58.72%)	20 (5%)	<0.001
Which baby needs KMC?	0 (0%)	109 (27.95%)	281 (72.05%)	109 (27.95%)	262 (67.18%)	19 (5%)	<0.001
Who are all the mothers who can practice KMC?	0 (0%)	216 (55.38%)	174 (44.62%)	311 (79.74%)	79 (20.26%)	0 (0%)	<0.001
When is KMC instituted?	21 (5.38%)	270 (69.23%)	99 (25.39%)	261 (66.92%)	129 (33.08%)	0 (0%)	<0.001
Where is KMC initiated?	0 (0%)	41 (10.51%)	349 (89.49%)	109 (27.95%)	221 (56.66%)	60 (15.38%)	<0.001
Can you continue KMC at home?	0 (0%)	11 (2.82%)	379 (97.18%)	128 (32.82%)	231 (59.23%)	31 (7.95%)	<0.001
Who else can provide KMC?	19 (4.87%)	99 (25.38%)	272 (69.75%)	211 (54.10%)	160 (41.03%)	19 (4.87%)	<0.001
What is the normal position of the baby during KMC?	0 (0%)	221 (56.66%)	169 (43.34%)	308 (78.97%)	82 (21.03%)	0 (0%)	<0.001
What should be the mother's posture while providing KMC?	0 (0%)	211 (54.10%)	179 (45.90%)	309 (79.23%)	81 (20.77%)	0 (0%)	<0.001
How to give KMC when the mother is sleeping or resting	9 (2.31%)	209 (53.59%)	172 (44.10%)	321 (82.31%)	69 (17.69%)	0 (0%)	<0.001
What should be the baby's clothing?	0 (0%)	131 (33.59%)	259 (66.41%)	268 (68.72%)	81 (20.77%)	41 (10.51%)	<0.001
What is the minimum duration of KMC per sitting?	9 (2.31%)	140 (35.90%)	241 (61.79%)	169 (43.33%)	202 (51.80%)	19 (4.87%)	<0.001
When should KMC be discontinued?	41 (10.51%)	81 (20.77%)	268 (68.72%)	208 (53.33%)	141 (36.15%)	41 (10.52%)	<0.001
What are the advantages of KMC?	0 (0%)	279 (71.54%)	111 (28.46%)	91 (23.33%)	299 (76.67%)	0 (0%)	<0.001
What is the indicator that the baby is well during KMC?	9 (2.31%)	69 (17.69%)	312 (80.00%)	80 (20.51%)	286 (73.33%)	24 (6.16%)	<0.001

[Table/Fig-2]: Knowledge about KMC among the mothers and grandmothers.
p-value <0.05 considered significant

three fourth (72%) of the mothers were housewives and 92.6% of the mothers were living in an extended family. Forty nine percent of mothers belonged to the upper socio-economic class as per Modified BG Prasad scale and none were from the lower class. Forty nine percent of the mothers had preterm neonates below the gestational age of 31 weeks and 38.97% had a neonate with a birth weight between 1.5 to 2.5 kg. On the analysis of the demographic data of the grandmothers, about 38.2% of them were below the age of 50 years.

The knowledge scores for the 15 questions on the evaluation of understanding and practice of KMC were compared between the two groups [Table/Fig-2]. For all the 15 questions the grandmothers had a significantly lower scores when compared to the mothers. Specifically, the grandmothers had no knowledge for a few questions in the questionnaire like -When is KMC instituted?, Who are all the mothers who can practice KMC?, What is the best position for the baby during KMC?, What is the posture of the mother during KMC? and How to give KMC when the mother is sleeping or resting?

The mean knowledge score of the mothers was 23.10±1.55. The mean knowledge score of the grandmothers was 8.48±2.00. The Mann-Whitney U test was applied to study the difference in knowledge level of the mothers and grandmothers and it was found that the grandmothers had a significantly lower scores when compared to the mothers (p<0.001) [Table/Fig-3]. On analysis of the mean knowledge scores of the mothers with their age, educational status and socio-economic class, they were found to be statistically not significant (p-value=0.209, 0.691 and 0.731, respectively) [Table/Fig-4]. On analysis of the mean knowledge scores of the grandmothers with their age and educational status, they were found to be statistically not significant (p-value=0.320 and 0.226, respectively) [Table/Fig-5].

Parameter	Mothers (n=390)	Grandmothers (n=390)	p-value (Mann-Whitney U test)
	Mean	Mean	
Total score (Max=30)	23.10±1.55	8.48±2.009	<0.001

[Table/Fig-3]: Comparison of overall knowledge scores between the mother and grandmother dyad.
p-value <0.05 considered significant

	Parameters	Number (n=390)	Mean score (Max 30)	p-value (Fischer's exact test)
Age (years)	≤20	70	18±4.258	0.209
	21-25	162	23.33±1.99	
	26-30	101	25.6±1.884	
	≥31	57	25.16s±1.75	
Educational status of the mother	Uneducated	31	23±3.20	0.691
	Primary school	10	25±0.55	
	Middle school	69	21.57±3.11	
	Higher secondary school	169	21.83±2.25	
	Graduate	89	25.75±3.54	
	Post graduate	22	28.5±2.07	
Socio-economic class (Modified BG Prasad Scale)	I (Upper)	191	20.66±5.65	0.731
	II (Upper middle)	139	23.92±2.13	
	III (Middle)	39	23.31±2.29	
	IV (Lower middle)	21	23±3.20	
	V (Lower)	0	0	

[Table/Fig-4]: Comparison of knowledge scores of the mothers with their age, educational grade and socio-economic status.

	Parameters	Number (n=390)	Mean score (Max 30)	(Fischer's-exact test) p-value
Age (years)	≤50	149	7.8±3.59	0.320
	51-55	129	7.12±4.13	
	56-60	81	11±3.20	
	≥61	31	6.25±3.55	
Educational status of the grandmother	Uneducated	167	8.76±2.66	0.226
	Primary school	112	5.81±1.83	
	High school	111	11.22±6.19	
	Above high school	0	0	

[Table/Fig-5]: Comparison of knowledge scores of the grandmothers with their age and educational grade.

DISCUSSION

The practice of grandmothers raising their grandchildren is becoming more common across the globe [12]. As per the United States Census, there has been a 64% increase in the number of

grandchildren living with grandmothers in the last two decades [13]. While corresponding data from India is not available, a similar increase can be expected. In traditional Indian joint families the grandmothers make a large contribution in child rearing. Though nuclear families are increasing in India, the role of the grandmothers in child rearing is unrelenting [14]. Even in nuclear families the grandmothers are ushered in during childbirth and they contribute to a large extent in child rearing [14].

Though, there are many studies available demonstrating the benefits of KMC and knowledge levels of the mothers [15-20], there are no studies to evaluate the level of knowledge about KMC in the grandmothers. The mean knowledge scores of the grandmother (8.48±2.009) were significantly lower than the mothers (23.10±1.55) in this study. Though the grandmothers are not expected to have same knowledge levels like the mothers, authors in this study quantitatively demonstrated their knowledge levels. Further one of the important component of KMC is early discharge and continuation of KMC in their homes. It is imperative that the grandmothers have adequate knowledge about KMC to successfully support it in their homes.

A study by Roller CG observed that the family members are important for successful implementation of KMC [21]. A systematic review by Chan GJ et al., analysed 112 studies on the barriers and enablers for KMC in which the authors have observed lack of social support as an important barrier for KMC [22]. In few studies mothers felt that they were not supported in their homes for fostering KMC [23,24]. In a study done in Brazil, mothers felt the need for someone in the family, either grandmother or sister to support KMC [25]. The participants in that study felt that the grandmothers can take care of domestic work and also help the newborn care.

Cultural and educational differences have a significant impact on the level of knowledge about KMC in the mothers in many studies [20,26]. In the present study, no such impact was observed as none of the participant was from lower socio-economic class and about 71.8% of the mothers had educational levels above higher secondary schooling. For the successful implementation of KMC, it is important that the family is involved and support the mothers, especially for the mothers with multiple births [27]. A study from Ghana reports that a high proportion of the mothers continuing KMC at their homes had a strong family support [28]. Another study showed that about 90% of the mothers believed that their spouses can also provide KMC [29]. Encouraging the fathers and the grandparents to actively participate in providing KMC can make better implementation of KMC.

An Indian mother has to balance newborn care and domestic work in their homes. In countries like Brazil where gender roles are equal, this barrier is not an important determinant [28,30]. The role of grandparents, especially the grandmothers in child rearing is becoming more and more important [14]. In countries like India where gender inequalities exist, the support of the grandmothers who are often the decision makers in child rearing will be an important determinant for fostering home KMC.

Limitation(s)

In the present study, none of the participants were from the lower socio-economic class and more than two thirds of the mothers had educational level above the higher secondary schooling which has limited the comparison of knowledge scores across the socio-economic classes and the educational levels.

CONCLUSION(S)

This study had demonstrated that the grandmothers have a significantly lower knowledge about KMC. The provision of post discharge home KMC is a missing link in the continuum of KMC care. In our society, grandmothers are the important decision makers regarding the child rearing practices. There is an urgent need to empower them with the knowledge about KMC for the successful continuation of KMC in the home.

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