

The Effects of Kangaroo Mother Care (KMC) on the Fuss and Crying Time of Colicky Infants

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ABSTRACT

Background: Infantile colic is a common complaint in the first few weeks of the neonate's life. Due to its unknown etiology, there is not a specific therapy for this disease. However, various therapeutic options are recommended for reducing the pain and restlessness in the affected infants. Skin-to-skin contact via Kangaroo Mother Care (KMC) is known to increase the pain threshold and it seems to be a proper method for the care of these infants. This study aimed to evaluate the effect of KMC on infantile colic.

Methods: This case-control study was performed from March 2012 to March 2013. Subjects consisted of 55 exclusively breastfed infants ageing between 15-60 days with excessive fuss and crying who were referred to the Children's Clinic of Ayatollah Rohani Hospital in Babol, North of Iran. The neonates who weighed less than 2500 grams or had been diagnosed with genetic or clinical disorders were excluded from this study. The studied infants were subjected to KMC for at least 2 hours a day. Standard questionnaires were completed through interviews and Barr Scale was also conducted. The collected data were analyzed by SPSS software V.11.5 and T-test and a P-value of less than 0.05 was considered as significant.

Results: According to the results of this study, the fuss and crying time of the infants before the KMC was 2.21 ± 1.54 hours per day while it reduced to 1.16 ± 1.3 hours per day after the implementation of KMC ($p=0.001$).

Conclusion: KMC could be practiced at home as a simple and safe method of diminishing the fussiness and crying time in colicky infants.

Key Words: Colic, Colicky Infants, Fussiness, Mother Care (KMC), Kangaroo

Introduction

Infantile colic is one of the most frequent complaints made by the parents of the children referring to physicians and clinics during the first few weeks of life. Colic is defined as fussiness and crying in infants who are otherwise in healthy condition. In some papers, colic incidence has been reported to be between 5-19% (1) and even 40-50% depending on the methods used to control it (2). According to a research conducted in Iran, the overall incidence rate of colic reaches 20% (3). Unfortunately, the etiology of colic remains unknown and it is believed to be a multifactorial disease (4-7).

Normally, colic is considered as a clinical sign synonymous with acute and unexpected abdominal pain. It is a behavioral syndrome usually occurring within the first three months of

the infant's life and it is manifested as self-limited pain. Colic is presumed to be secondary to an underlying cause of the gastrointestinal tract, which is characterized by severe intestinal pain. The affected infants appear quite normal except at the point of colic incidence and in 30% of the cases, pain and restlessness might last until the infant reaches 4 or 5 months of age (8).

The behavioral pattern of colicky infants remarkably changes during a long period of time making them resistant to any forms of relieving behaviors. Clenching fists, curving the feet over the abdomen and the changing of the back into the arc mode are among the frequent signs of colic disease. Furthermore, the infant's flushed face manifests the pain caused by the disease.

Wessel and colleagues quantitatively defined

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colic as a triple rule (9) (The Rule of Three). According to this rule, a colicky infant is recognized by the start of crying at the third week of birth, which might last for more than 3 hours a day, repeating at least three days a week and continuing for more than 3 weeks. Of course, the second criterion could be neglected (modified Wessel's criteria).

Nowadays, there are many effective pharmacological and non-pharmacological techniques for diminishing pain and the tendency to use non-pharmacological approaches has significantly increased (6, 10, 11). Such examples of these methods are changing the infant's position, bandaging, restricting the infant's movements, hugging, shaking, playing music, reducing environmental stimulations and calming the infant through skin-to-skin contact and non-nutritive sucking. Nevertheless, the actual mechanism and effectiveness of such practices still remain unknown (6, 10, 11).

Facilitating the use of pain relieving methods, which involve mother-infant communication and interaction, has been reported to be effectual in relieving pain and stress in colicky infants. According to recent findings, skin-to-skin contact is proven to have analgesic effects on colicky infants (4-7). A number of studies have confirmed that skin-to-skin contact with mother during the vaccination of infants could remarkably reduce the crying time after the injection (4). However, the exact effect of skin-to-skin contact on the duration of crying and fussiness is not fully comprehended. This study aimed to determine the effects of Kangaroo Mother Care (KMC) at home on the duration of crying and fussiness in healthy neonates.

Today, this method is used as a way of providing care for premature infants (12) while it has numerous positive effects on term infants as well. For instance, it is able to enhance deep sleep (Non-REM) and improve the effects of melatonin and circadian rhythm in neonates (6, 13, 14).

Method

This quasi-experimental study was performed from March 2012 to March 2013. In total, 55 infants ageing between 15-60 days who were exclusively breastfed and had persistent colic symptoms were studied. The subjects consisted of infants who were referred to the Children's Clinic of Ayatollah Rohani Hospital of Babol due to excessive fussiness and crying. They were diagnosed with colic by a neonatologist via history

and physical examinations based on the Wessel's criteria (8).

A urine analysis test was conducted on the colicky infants in order to screen urinary tract infections (UTI) as a major cause of restlessness. The exclusion criteria of this study were as follows: 1) weighing less than 2500 grams; 2) previous diagnosis of any genetic or clinical disorders.

The researcher interviewed the subjects' parents and gave them a Barr chart ruler (15) to obtain information about the infants' time of sleep, nutrition and awakening hugging or holding the babies in cradle or car were included in the answers given by the parents. Within 3-5 days, the parents followed the same care patterns which were collected in the next check-up charts. Finally, the parents received instructions on the KMC method by the researcher.

In the teaching procedure, the researcher would give the infant's mother a special vest to wear and keep the baby in a kangaroo care position. Then, he would ask her to practice the method for at least 2 hours a day. Based on the diagramed charts (Figure 1), the peak time of the infant's fussing was identified while skin-to-skin contact was recommended during this period. Afterwards, the infants were followed up for a week and a phone number was available for giving any advisement to their parents if necessary.

For expressing the profile of samples, descriptive statistics including frequency tables and mean and standard deviations were used.

Data analysis was done using SPSS software V.11.5. To compare the study groups, independent t-test was used for quantitative variables and the P-value of less than 0.05 was considered as significant.

Results

In this study, 58 infants who were diagnosed with colic were included. By the end of the study, only 55 subjects remained in the experiment due to missing one case with uncooperative parents and 2 cases with inaccurate filling sheaths. In total, 55 infants with non-probability convenience sampling participated in the experiment. Demographic data of the infants as well as those of their mothers' are summarized in Table 1.

Before running KMC, the mean crying time in infants was 2.21 ± 1.54 hours per day and it reduced to 1.16 ± 1.3 hr/day after the intervention. This difference was considered to be statistically significant after the paired t-test ($P=0.001$).

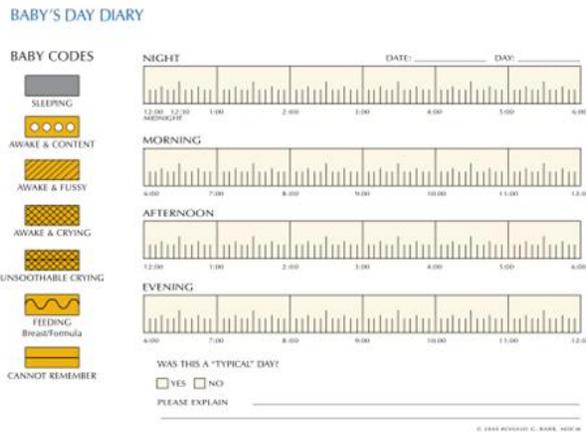


Figure 1. Chart ruler of professor Barr

Moreover, a significant decrease was observed in the crying time of the infants of 15-30 days of age during the first visit ($P < 0.001$). However, no significant decrease in the crying time was detected in other two age groups (30-45 and 45-60 days). Before-after intervention differences in the three studied age groups were not considered to be significant ($p=0.213$) (Table 2).

On the other hand, the relationship between KMC and the infants' gender indicated a significant decrease in the crying time of both the female and male subjects. The considered P-values were 0.001 and 0.0048, respectively.

Female infants were found to have more

before-after intervention differences compared to the male ones, which was not considered to be significant ($p=0.72$) (Table 2).

The relationship between KMC and route of delivery showed that the crying time of the infants born via vaginal delivery significantly decreased compared to the infants who were born via Cesarean section. The considered P-values were 0.004 and 0.09, respectively (Table 2).

Furthermore, the vaginal delivery group were found to have more before-after intervention differences compared to the Cesarean group, which was not considered to be significant ($p=0.15$) (Table 2).

The relationship between KMC and the mothers' education was indicative of a significant decrease in the crying time of the infants coming from highly educated mothers. ($p=0.001$ vs. $p=0.177$). In addition, the before-after intervention differences were found to be more in highly educated mothers compared to the group of a lower academic degree, which was not considered to be significant ($p= 0.194$) (Table 2).

Discussion

According to the findings of the current study, practicing KMC at home could reduce the crying time in colicky infants. KMC has been proven to be effective in diminishing fussiness in both male and female neonates.

Table 1. Demographic data of babies and their mothers

variables	Status	Frequency	Percentage
Age (day)	15-30	23	41.8
	31-45	17	30.9
	46-60	15	27.3
Sex	female	23	41.8
	male	32	58.2
Mother's education	low	27	49
	high	28	51
Type of delivery	Vaginal	23	41.8
	Cesarean	32	58.2

Table 2. Influence of KMC on fuss and crying time in colicky infants according to infant's age, sex mother education and type of delivery

Time(hr)		Before(mean±SD)	After (mean±SD)	P-value	Diff (after -before)
Infant	15-30 (n= 23)	2.49±1.67	0.79± 0.74	< 0.001	-1.69± 1.95
Age	31-45 (n=17)	2.00± 1.31	1.47 ± 1.68	0.395	-0.53±2.49
	46-60 (n=15)	2.02±1.61	1.36±1.4	0.312	-0.67±2.46
	Infant	F (n=23)	2.20±1.57	1.28±1.4	0.007
Sex	M(n=32)	2.22±1.55	1.07± 1.22	0.048	-0.92±2.41
Mother	low (n=27)	2.02±1.52	1.38±1.49	0.177	-0.64±2.4
Education	high (n=28)	2.39±1.57	0.94±1.04	0.001	-1.45±2.15
Type of delivery	Vaginal (n=23)	2.59±1.76	1.01±1.2	0.004	1.58±2.37
	Cesarean(n=32)	1.94±1.33	1.26±1.36	0.09	-0.67±2.19

The efficacy of KMC in the infants ageing between 15-30 days was significant compared to other age groups. This difference might be due to the lower number of the infants in the age groups of 30-45 and 45-60 days. On the other hand, it was inferred that KMC could have a stronger effect on colic if it starts during the early phases of the disease progress.

Furthermore, KMC was observed to be more efficient in case of highly educated mothers, perhaps due to their better understanding of the baby's crying. In mothers with a lower academic degree, however, colicky crying was likely to be mistaken for any other normal forms of crying.

Further results of the present study demonstrate that the infants who were born via vaginal delivery showed a better response to KMC compared to the ones in the Cesarean section group. This difference might be due to an accelerated intestinal colonization with lactobacilli by recto-vaginal organisms. In these infants, colic was affected by factors other than skin-to-skin contact (16-18).

Apparently, there are several factors known to affect the response of colic to KMC which need to be further evaluated in larger sample sizes in future studies (13).

Consistent with our study, Ellet in 2004 demonstrated that KMC could reduce the crying time and restlessness and increase the duration of deep sleep and relaxation in colicky infants (13). In another study conducted on colicky infants, Saeidi and colleagues noticed that practicing KMC significantly reduced the symptoms of colic including irritability and crying in comparison with the control group (19). In another experiment, the same researchers claimed that vaccination pain in infants reduced through KMC (12).

In 2005, Ludington and colleagues published a paper about the analgesic effects of KMC on preterm infants during the heel-stick neonatal screening (20). In 2000, Gray and colleagues demonstrated that infants who received KMC for at least 10-15 minutes during heel sticking experienced less pain compared to the infants who were wrapped in swaddling clothes. Thus, it was concluded that skin-to-skin contact reduced the crying time in the case group. Additionally, it was able to prevent a significant increase in the heart rate of the studied neonates (6).

In this regard, the study of Johnston stated that preterm infants receiving KMC had considerably lower pain levels during the sampling process and such changes in the infants' face as lowering or wadding the eyes were significantly less common.

For another thing, the pain scores in the KMC group were significantly lower than the control group, which was indicative of the impact of the kangaroo method on relieving pain during heel lancing in the infants of over 32 weeks of age (7). In another study in 2008, Castrol and colleagues realized that skin-to-skin contact between mother and infant during heel sticking could result in less facial changes by the infant as well as lowering the heart rate and reducing the crying time in the case group (4).

The findings of Akcan E. confirmed that skin-to-skin contact was able to reduce the infant's physiological and behavioral responses and reactions to painful stimuli. Neonates who received KMC during injection experienced moderate pain during the first minute and mild pain during the second and third minutes while the infants in the control group who did not receive KMC underwent severe pain during and after the injection (21).

In their study, Sajedi and colleagues evaluated the impact of KMC on the physiological responses to pain in healthy and term neonates during the intramuscular injection of Vitamin K. They concluded that 3 minutes after the injection, the heart rate of the infants in the case group significantly lowered compared to the control group. Furthermore, the arterial oxygen saturation in the case group, during and 3 minutes after the injection, was significantly higher than the control group. Since the infant's response to pain depends on such physiological variables as changes in the heart rate and arterial oxygen saturation, these results suggest that the intensity of pain in the intervention group was noticeably lower than the control group (22).

Conclusion

The current study confirms that KMC is able to reduce the restlessness and fussiness in colicky infants. Therefore, we recommend KMC, alongside other medical interventions, as an efficient method of diminishing the crying time and restlessness in colicky infants.

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