

REGULAR ARTICLE

Use of baby carriers to increase breastfeeding duration among term infants: the effects of an educational intervention in Italy

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ABSTRACT

Aim: To investigate whether the use of baby carriers by term infants during the first month of life is associated with increased rates of breastfeeding.

Methods: Prospective cohort study. Two hundred mothers with healthy term infants were assigned to receive either a baby carrier and some accurate information and training about the use thereof or only information about breastfeeding. Study groups were followed by phone interviews.

Results: Of the 100 mothers to whom baby carriers were provided, 69 utilized it for at least 1 h per day during the first month of life, while 31 did not use it at all. While breastfeeding rates were similar in both intervention and control groups at discharge from the maternity ward, mothers in the intervention group scored significantly higher with their infants at two (72% vs 51%) and at 5 months of age (48% vs 24%), respectively. The intervention group infants were breastfed significantly more frequently than those of the control group.

Conclusions: Our finding seems to suggest that the use of baby carriers in healthy term infants during their first month is associated with increased breastfeeding duration.

INTRODUCTION

Kangaroo mother care (KMC), a technique developed in Colombia to face the problem of neonatal units overcrowding, provides ideal conditions for low-birth-weight infants to thrive (1,2). KMC is safe and cheap, reduces morbidity in impoverished settings and improves breastfeeding rates and mother–infant bonding (3). Moreover, also in term infants, a skin-to-skin contact shortly after birth has been associated with an increased duration of breastfeeding (4,5). However, in the literature, no studies are available about the effects on breastfeeding duration of mother–infant body contact beyond the first hours after birth. Moreover, no data are available on the effects of a non-skin-to-skin contact.

Healthy term infants do not need a prolonged and continuous skin-to-skin (SSC) contact to obtain thermal stability, stimulation and the other advantages provided by KMC to preterm infants; however, a more frequent body contact with their mothers could favour breastfeeding.

While KMC as well as early mother–newborn contact soon after birth has been much studied, the role of a more frequent, non-skin-to-skin, mother–infant contact during the first month of life has never been investigated.

The objective of this cohort study was to investigate the effects of an educational intervention on the use of baby carriers during infants' first month of life; in particular, our research question was to investigate whether the duration of breastfeeding might be longer, if the mothers take their healthy term newborns in a baby carrier for some time during the first month of life. Unlike the KMC approach, the contact is non-skin-to-skin, the mother wears normal clothes, and the baby is not naked.

METHODS**Design**

This prospective cohort study was conducted at the Departments of Obstetrics and Pediatrics of the Medical School, University *Federico II* of Naples, Italy.

Key notes

- Mother–newborn SSC after birth can favour breastfeeding.
- The effect on breastfeeding duration of a non-SSC by means of a baby carrier during the first month of life has never been investigated.
- The use of baby carriers by term infants during the first month of life seems to increase breastfeeding rates.

Abbreviations

KMC, kangaroo mother care; SSC, skin-to-skin contact.

Participants

Participation was offered to all women who delivered their baby between February 1 and March 31, 2011.

Ethical approval

The Ethical Committee of the Azienda Ospedaliera Federico II approved the design of the study.

DESIGN

Inclusion criteria

Women who delivered a singleton, healthy infant, with a birth weight ≥ 2.500 g and who were willing to consider breastfeeding were eligible. Written informed consent was obtained by the participants.

Intervention

The study population was randomly assigned to either an intervention or a control group, depending on the month of birth, as this seemed the most feasible and adequate manner to avoid communication between the study groups. After random placement of the study groups to specific months (February or March), one of the authors (GIC) assigned the first 100 eligible infants born in each month to the interventions established. The mothers of the intervention group, all of whom gave birth between February 1 and February 25, 2011, were informed on how breastfeeding works. They were also provided with a cloth baby carrier (0 month type, Baby-Björn, Bredaryd, Sweden) and were carefully instructed by one of us (GIC) on how to utilize it. In a 30-min educational session, the mothers were shown how to put their baby into the carrier and take him/her out. On putting the baby into the carrier, he/she was not naked, while the mothers were not asked to take off their own clothes. It was recommended to utilize the baby carrier as often as possible, or at least 1 h a day, during the first month after birth. The women of the control group, who had given birth from March 5 to 31, 2011 and had no contact with the mothers of the intervention group, were only given information about the advantages and the management of breastfeeding.

DATA COLLECTION METHODS

Follow-up

The study groups were contacted by telephone every week during the first month after birth and every 4 weeks thereafter, until infants' 5 months of age. Information on the use of baby carriers and on baby feeding on the day before interview was collected by phone calls. To collect such information, a simple questionnaire was proposed to the mothers. The questions investigated the frequency of sucking, both during day and night, on the day preceding the interview. The questions proposed to the mothers were as follows: 'How often did you breastfeed your baby during day and night yesterday?' 'Did you use the baby carrier last week?' 'If so, how many hours per day?' 'Explain why you used or did not use the baby carrier'.

Outcome

The main outcomes of the study were the rates of exclusive and of any breastfeeding at two and at 5 months of age, sucking frequency during the first and the second month of life and the use of baby carriers during the first month of life.

Blinding

The phone calls, which were made in the first month of life to investigate baby carrier use as well as breastfeeding frequency, were conducted by GIC. All the following interviews, whose objective was to obtain information on breastfeeding and on sucking frequency, were performed by VT and CF. The latter were involved in a project of breastfeeding rates monitoring in the Campania Region, and they were unaware of the study that was being conducted.

Definition of breastfeeding

We used the 24-h dietary recall method recommended by the World Health Organization to define exclusive (no other food or fluids given) and partial (food and nutritive fluids, including formula milk, in addition to breast milk) breastfeeding (6). Any breastfeeding was defined as any consumption of human milk, independently from the quantities and from the other foods consumed.

Sample size and statistical analysis

Epidemiological data from the Campania Region report a frequency of any breastfeeding of $\sim 25\%$ at the age of 5 months. Assuming a 10% loss to follow-up, we calculated that we would require ~ 100 infants for each group, to detect a statistically significant increase of 50% ($\alpha = 0.05$, $1-\beta = 80\%$) in the rate of any breastfeeding among the infants of the intervention group. Comparison between groups was performed by intention-to-treat analysis. Chi-squared and relative risk with 95% confidence intervals were used to compare the incidence of breastfeeding between the groups. Logistic regression was also applied to investigate the potential effect of confounding variables (mothers' education, parity, previous breastfeeding, type of birth) on the association between breastfeeding and utilization of the baby carriers.

RESULTS

The first 100 consecutive women, giving birth in February and in March 2011, responding to the eligibility criteria and accepting to participate, were respectively included in intervention and control group. Four and five women, respectively, did not accept to be enrolled and were substituted by the following mothers (Fig. 1).

Features of the study groups

Table 1 shows some characteristics of the study groups. There were no remarkable differences in any of the variables measured. On our ward, the practice of an early skin-to-skin contact after birth has not yet been implemented,

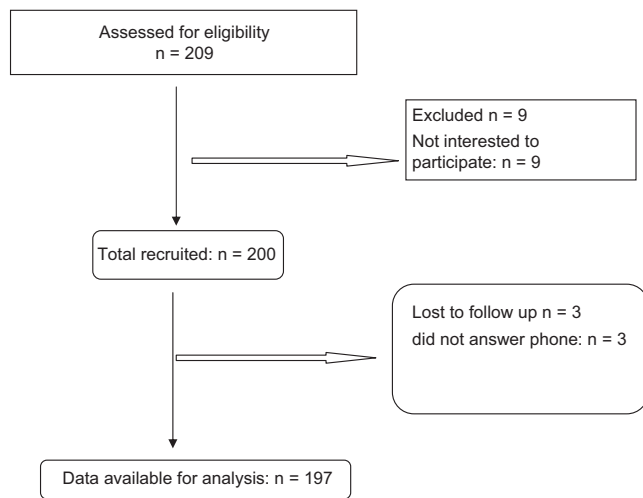


Figure 1 Flow diagram of the study.

Table 1 Sample description

Characteristic	Intervention group (n = 100)	Controls (n = 100)	p
Caesarean section	62	69	0.3
Maternal age			
<20 years	2	2	1.0
>35 years	22	15	0.2
Maternal education			
<8 years	15	22	0.2
Multiparae	47	45	0.8
Previous breastfeeding	39	33	0.4
Early mother–infant SSC	0	0	–

and the first contact between mother with her newborn usually occurs 3–6 h after birth.

Use of baby carriers

Among the 100 mothers to whom baby carriers were provided, 69 utilized it for at least 1 h per day during the first month of life, while 31 did not use it at all. Among the mothers in the control group, only three did utilize a baby carrier, but in an erratic way and for a short time. Table 2 clarifies the reasons for using or not using a baby carrier, and it also highlights the advantages reported by the mothers who utilized it. Several mothers reported more than one reason for accepting or refusing the baby carriers. All mothers who used a baby carrier would recommend it to their friends.

Breastfeeding rates

Table 3 shows the rates of breastfeeding at discharge from the maternity ward, at two and at 5 months of age by intention-to-treat analysis. Three mothers of the intervention group were lost to follow-up from the age of 2 months. While breastfeeding rates were similar in the two groups at the discharge from the maternity ward, breastfeeding was significantly more likely among the mothers in the

Table 2 Utilization of the baby carrier and maternal report about advantages and limits*

Did utilize the baby carrier: n = 69
It does favour bonding and intimate contact: (n = 65)
It does favour the understanding of baby needs (n = 53)
It is useful for breastfeeding (n = 58)
It is useful for going out and for doing homework (n = 40)
Did not utilize the baby carrier: n = 31
I had problems with caesarean section pain (n = 15)
The baby cries when he/she is in the carrier (n = 20)
I do not feel comfortable with the carrier (n = 10)

*Only three mothers of the control group used a baby carrier, but its utilization was erratic (3–5 times during the first month of life).

intervention group, both at two (47% vs 32% and 74% vs 51%, respectively, for exclusive and any breastfeeding) and at 5 months of age (8% vs 1% and 48% vs 24%). ($p < 0.05$).

Among the 31 mothers of the intervention group, who did not use a baby carrier, breastfeeding rates were not different from those in the mothers of the control group (data available from the authors).

Frequency of breastfeeding

Table 4 provides information on the frequency of feedings during the first and the second month after birth.

The mothers in the intervention group were more likely to breastfeed their babies more than seven times during the day: 44% vs 16% during the first month and 28% vs 10% during the second month of life ($p < 0.01$). A number of night feeds ≥ 3 were also more likely in the mothers of the intervention group: 35% vs 10% in the first month and 8% vs 0% in the second month of life, $p < 0.01$.

Among the mothers in the intervention group, who did not use a baby carrier, the frequency of feeds was not different from the one in the control group (data available from the authors).

DISCUSSION

This is probably the first study that investigated the use of baby carriers to establish whether they are accepted by mothers, to favour a more frequent, non-skin-to-skin, mother–infant contact in healthy term infants. Our hypothesis was that such body contact could favour the duration of breastfeeding. Despite the relatively small extent of the research, which was conducted in only one hospital, the results seem to suggest that the use of baby carriers during the first month of life is feasible and can be associated with more frequent day and night feedings and with a longer breastfeeding duration.

Several studies have suggested that KMC can provide several advantages to preterm infants and mothers, such as an increased frequency and duration of breastfeeding representing one of such advantages (1–3,7–11). However, few data have been published on the advantages of a more frequent body contact of healthy term infant with their mothers, and the available information only takes into

Table 3 Breastfeeding rates at discharge from maternity ward, at 2 and 5 months of age (intention-to-treat analysis)

Breastfeeding	Intervention group (n = 100)	Controls (n = 100)	RR (95% IC)	Adjusted OR*(95% IC)
At discharge from maternity ward				
Exclusive	58 (58)	52 (52)	1.1 (0.8–1.5)	
Partial	27 (27)	29 (29)	0.9 (0.6–1.4)	
Any	85 (85)	81 (81)	1.0 (0.9–1.2)	
No breast	15 (15)	19 (19)	0.8 (0.4–1.4)	
At 2 months†				
Exclusive	46 (47)	32 (32)	1.5 (1.0–2.1)	
Partial	26 (27)	19 (19)	ns	
Any	72 (74)	51 (51)	1.5 (1.1–1.8)	1.8 (1.1–3.1)
No breast	25 (26)	49 (49)	0.6 (0.4–0.8)	
At 5 months†				
Exclusive	8 (8.2)	1 (1)	1.9 (1.4–2.5)	
Partial	39 (40)	23 (23)	1.7 (1.1–2.0)	
Any	47 (48)	24 (24)	2.0 (1.3–3.0)	2.9 (1.2–6.9)
No breast	50 (52)	76 (76)	0.6 (0.5–0.8)	

*adjusted for maternal education, parity, previous breastfeeding and type of birth.

†at 2 and 5 months information was not available for three subjects of the intervention group.

Table 4 Frequency of breastfeeding during the first and the second month after birth

Frequency of feeds	Intervention group (n = 100)	Controls (n = 100)	p
% with ≥7 feeds during the day			
First month	44	16	<0.01
Second month	28	10	<0.01
% with ≥3 feeds at night			
First month	35	10	<0.01
Second month	8	0	<0.01

consideration the effects of an early skin-to-skin contact soon after birth (12–14). Moreover, no research has been conducted to assess whether or not a more frequent mother–infant contact through the use of baby carriers during the first month after birth may favour breastfeeding.

A simple measure to increase breastfeeding rates in the population of healthy term newborns could represent a relevant public health intervention. As it seemed not feasible to promote a prolonged SSC in term infants, we investigated whether the women enrolled in the study were willing to have a more frequent body contact for a limited time (at least 1 h per day for 1 month), using a comfortable baby carrier to wear over the mother's clothes and with the baby not naked. Such carriers, which can be used indoors and outdoors, were largely appreciated by most mothers, who used them sometimes for several hours each day. The data show that the frequency of breastfeeding was similar in the study groups at maternity ward discharge, but breastfeeding duration resulted significantly longer in the mothers of the intervention group. There is evidence that a skin-to-skin mother–infant contact can favour bonding and stimulate the production of prolactin and oxytocin (5), but data are not available in the case of a non-skin-to-skin body contact (15, 16). A possible bias in this study might lie in the different rates of mother–infant skin-to-skin contact soon after delivery in the study groups.

Unfortunately, our hospital, as well as all other hospitals in our region, did not witness early mother–infant contact after birth, mainly because of logistical difficulties and poor communication between obstetric and neonatal staff.

It is interesting to note that the frequency of feedings was significantly higher in the mothers of the intervention group; this fact could represent the physiological mechanism, by which an increased time of mother–infant body contact can increase breastfeeding rates.

One of the limits of this study is represented by its limited sample. Nevertheless, it is hoped that, after this preliminary study, others will follow to include a larger and more varied population. A second limitation is represented by the possibility of unknown confounders, which may have not considered among those comprised in the logistic regression analysis performed. A third problem is represented by the unusually high frequency of caesarean section in this part of Italy, which makes this population less representative of the general obstetric patient population worldwide and raises the possibility that the predominance of caesarean section mothers may have reduced the broad applicability of these findings.

The strength of this study is represented by a sound design and an excellent follow-up of the study groups, which is likely to have minimized the risk of several kinds of bias. Biological plausibility is also another asset of the study.

Finally, increasing breastfeeding rates should be a public health priority both in industrialized and developing countries. More evidence is needed to establish if simple measures, like the use of baby carriers, can favour an increase in such rates.

CONCLUSIONS

The use of baby carriers in healthy term infants during their first month of life seems to be associated with an increased breastfeeding duration.

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This study did receive support from the Department of Pediatrics of the University of Naples. BabyBjörn, Sweden, provided baby carriers, but had no part in design and conduction of the study and analysis of the data.

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