

# Kangaroo Mother Care Practices for Newborns at a Referral Center in Abidjan

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## Abstract

**Introduction:** Kangaroo mother care (KMC) or skin-to-skin contact help to prevent hypothermia, promote breastfeeding and baby-mother attachment. It's an effective technique management of low-birth-weight (LBW) newborns. The objective of this study was to investigate the efficacy of KMC for LBW newborns admitted to the university health center of Cocody in Abidjan, Côte d'Ivoire. **Population and Methods:** This was a retrospective study focusing on a cohort of low birth weight newborns admitted in KMC unit during the period from September 2019 to July 2021 (23 months). We don't include newborns whose records were incomplete or whose length of stay in kangaroo care had been less than 72 hours. We collected sociodemographic, maternal, obstetric, neonatal characteristics and KMC data (age/weight at inclusion, thermoregulation, feeding, growth evolution and complications). **Results:** We included 137 newborns with a mean gestational age of 31 SA. Mean birth weight was 1401 g. The majority of mothers worked in the informal sector (45%). The average length of stay in conventional care was 17 days. At inclusion in KMC, the mean weight was 1376 g (minimum 900 g). The most common complications were anemia (16.2%), weight loss (9.5%) and infection (2.9%). Only 13% of newborns received exclusive breast milk. The average daily weight gain was 25 g. Average discharge weight was 1570 g. The hypothermia rate was 17%. We notified 2 deaths (1.5%). Factors influencing regular weight gain of 25 g/day were mother's marital status and length of stay in conventional care. **Conclusion:** In developing countries such as Côte d'Ivoire, KMC is a good alternative to conventional care.

## Keywords

Neonatal Mortality, Low Birth Weight, Kangaroo Care, Cote d'Ivoire

## 1. Introduction

The fight against neonatal mortality is a public health priority. Significant resources are mobilized through a variety of strategies and actions for a significant improvement in the survival of the newborn. According to WHO data, 5 million children died worldwide in 2021 including 2.3 million newborns [1]. Sub-Saharan Africa accounts for 47% of these newborn deaths [1]. The main causes of death are infections (28%), prematurity and/or low birth weight (25%) and asphyxia (24%) [2]. Côte d'Ivoire, located in this region of Africa, is one of the countries with the highest neonatal mortality rate [3]. The leading cause of death in this country is attributed to LBW [4]. In order to achieve the United Nations (UN) 3rd Sustainable Development Goal (SDG), the country must implement strategies to improve the survival of LBW.

Among the problems linked to this survival, we have hypothermia and feeding, which can be solved by KMC. This involves promoting skin-to-skin contact by placing the newborn on the mother's chest, to avoid hypothermia [5], promote breastfeeding [6] [7] and strengthening the mother-child relationship [8] [9]. It is in this context that the kangaroo unit at the CHU of Cocody began its activities in September 2019. The present study should provide data and information on the characteristics of LBW for which the method could be safely provided. The aim of this work was to evaluate the results obtained in this unit. The general objective was to study KMC practice at CHU of Cocody. The specific objectives were to evaluate the efficacy of SKs in terms of growth, thermoregulation, complications and survival of LBW.

## 2. Population and Methods

### 2.1. Place of Study

This study took place in the kangaroo care unit of the pediatric ward at the university health center of Cocody in Abidjan (CHU), a level 3 hospital.

### 2.2. Type, Population and Duration of Study

This was a retrospective study with descriptive and analytical aims of a cohort of newborns with LBW admitted in the kangaroo unit from September 2019 to July 2021 (23 months). We did not include newborns with incomplete medical records or whose length of stay in kangaroo care had been less than 72 hours.

### 2.3. How the Kangaroo Unit Works

The unit consists of a room with three beds with all the amenities. Two seats are used for mothers' training. Newborns are admitted after a period of hospitalization with their mother 24 hours a day. A pre-inclusion interview is held with the parents. Breast milk is the preferred food. It is expressed and used raw. Weights are recorded daily, and temperatures are taken every 3 hours. Mothers provide most of the care under the supervision of a nurse. Kangaroo care is discontinued

when the newborn reaches 2000 grams or can no longer tolerate the kangaroo position. Kangaroo care continues at home, with weekly follow-ups when the child is autonomous and has achieved a satisfactory weight gain (15 g/d for 3 days).

## 2.4. Data Collection and Analysis

Data were collected from the hospital medical record, with the inclusion and kangaroo follow-up. We studied the following parameters: maternal sociodemographic data (age, marital status, professional activities, level of education), pregnancy data (number of prenatal consultations, pathologies during pregnancy, delivery (place, term, type of delivery), neonatal data (sex, weight, events in conventional care), KMC data: at inclusion (post-conceptual age, anthropometric data, feeding mode, weight evolution (daily weight gain, weight at discharge, body temperature, complications), data at discharge (anthropometry, feeding, mortality and length of stay in SK). Efficacy criteria were daily weight gain (15 - 30 g/kg), absence of hypothermia, absence of hypoglycemia, percentage survival. Data were entered and analyzed in Excel and XLSTAT. Variables were expressed as mean T standard deviation (SD) and proportions as percentages. A p-value < 0.05 was considered statistically significant.

## 3. Results

During the study period, 137 newborns were included.

### 3.1. Maternal Characteristics

In 21% of cases, the newborns were the result of multiple pregnancies (25/119) which made a total of 119 mothers (see **Table 1**).

**Table 1.** Maternal socio-demographic characteristics.

	Number (n = 119)	Percentage (%)
<b>Maternal age (years)</b>		
Under 18	7	6
18 - 35	95	79
>35 years	17	14
<b>Geographical origin</b>		
Urban	102	86
Rural	17	14
<b>Education level</b>		
Never attended school	45	38
Primary	26	22
Superior	15	13
<b>Professional activity</b>		
Informal sector	53	45
Housekeeper	39	33
Pupil/Student	13	11
Civil servant	8	7

**Continued**

Unemployed	5	4
<b>Marital status</b>		
Brides	24	20
Unmarried	95	80

The majority (80%) were aged between 18 and 35, and 45% of them worked in the informal sector. They were out of school in 39% of cases, and 22% were primiparous.

**3.2. Pregnancy Follow-Up and Delivery**

Only 37% of mothers had attended at least 4 prenatal consultations.

**Table 2** summarizes the main complications observed during pregnancy.

**Table 2.** Complications observed during pregnancy.

Pathology	Number	Percentage
HTA/Pre-eclampsia/Eclampsia	18	11
Infectious malaria	13	15
Placental anomalies	4	3
Menace of premature delivery	4	3
Anemia	3	2
No pathology	77	65

Delivery was vaginal in 63% of cases.

**3.3. Data Concerning Newborns in Conventional Care**

The sex ratio was 0.5. The median gestational age (GA) was 32 weeks of amenorrhea with extremes of 26 and 35.4. Mean birth weight was 1371 grams, with intervals between 900 and 2000 grams. Of the newborns, 64% were hypotrophic. All had stayed in conventional care for an average of 17 days (4 to 59 days). The main complications were infection (45%), respiratory distress (30%) and jaundice (9%). Newborns were fed a mixed diet (77.4%), followed by breast milk (16%) and artificial milk (6.6%).

**3.4. KMC Data**

At KMC inclusion, the median post-conception gestational age was 34 SA and the mean weight was 1376.8 grams. **Table 3** describes the characteristics of the newborns.

**Table 3.** Characteristics of newborns admitted to the Kangaroo Unit.

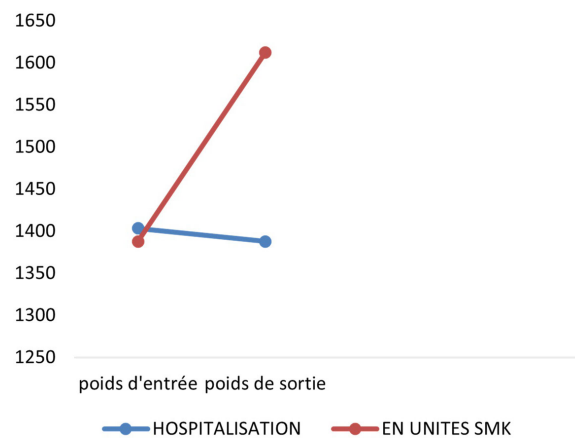
	Number (n = 137)	%
<b>Post-gestational age (SA)</b>		
28 - 32	12	9
32 - 36	113	82
>36	12	9

## Continued

	Weight (grams)	
<1000	2	1.5
1000 - 1500	98	71.5
>1500	37	27

The main complications were anemia (32%), weight loss (18%), infection (7%) and ulcerative colitis (2%). The type of feeding was mixed (78%), exclusive breast milk (14%) or artificial milk (8%). Breastfeeding and cup-feeding were the main feeding methods (86%). The average daily weight gain was 26 gr/kg, and the median weight gain during the stay was estimated at 200 grams.

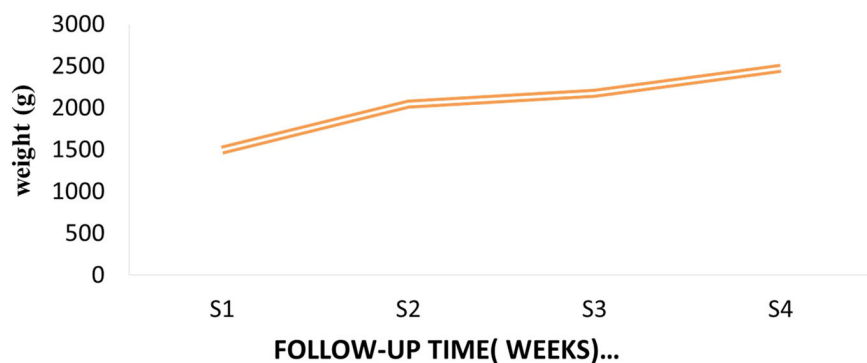
**Figure 1** shows the comparative evolution of average inpatient and kangaroo weights.



**Figure 1.** Comparative trend in average weights for inpatient and kangaroo care.

More than half (56.2%) of the newborns had an average length of stay of 8 days (extremes 3 and 23 days). At discharge, the median corrected gestational age was 35 SA. Average weight was 1577 g. We recorded two deaths, one at home and one during readmission and lost sight of 97% of newborns.

**Figure 2** shows the evolution of the average weight curve during the SMK follow-up.



**Figure 2.** Evolution of the average weight curve during follow-up.

Statistically significant factors associated with weight gain were mothers' marital status ( $p = 0.006$ ) and length of stay in conventional care ( $p = 0.029$ ) and are summarized in **Table 4**.

**Table 4.** Factors associated with weight gain in SK.

	Weight gain		(gram)		p	Chi <sup>2</sup>	OR
	>25 (n = 73)	<25 (n = 64)					
<b>Marital status</b>							
Married	65	89	45	70.3	0.006	7.56	3.43
Single	8	11	19	29.7			
<b>Length of stay in conventional care (days)</b>							
>14	40	55	24	37.5	0.029	4.76	2.14
<14	33	45	40	62.5			
<b>Gestational age (SA)</b>							
28 - 32	5	7	7	11	0.46	0.71	0.6
32 - 36	60	82	53	83			
>37	8	11	4	6			
<b>Complications in SK</b>							
Oui	24	33	39	61	0.001	2.41	0.57
Non	49	67	25	39			

#### 4. Discussion

This study enabled us to investigate the activities of the kangaroo unit at the CHU of Cocody. Among the 137 neonates meeting the inclusion criteria, the median gestational age in conventional care was 32 SA. This median GA has been reported by other authors [10]-[12]. At birth, the newborns had a mean birth weight of 1371 gr, comparable to that reported by Menezes *et al.* [10]-[13]. All newborns had remained in a conventional care unit until stabilization. This should be the rule in KMC units for better safety. This implies that the unit should be located in a conventional neonatology department [14]. The pathologies of premature infants encountered in this care remain the same in sub-Saharan Africa [15] [16]. In this study, they were dominated by neonatal infection (45%). The frequency of neonatal infections remains high, and is in itself a cause of prematurity and LBW [17]-[19]. At inclusion in KMC, 14% of newborns were exclusively breastfed. This rate was 46% in Colombia [20]. Exclusive breastfeeding (EBF) should be favored and encouraged in KMC.

However, there are a number of constraints, namely insufficient milk supply in mothers due to lack of stimulation in the first few days, insufficient weight gain under AME and unavailability of the mother. This percentage should be improved to enable newborns and their mothers to benefit from the advantages of this method [9] [21]-[25]. Mothers and nursing staff should be urged to extract breast milk early on the admission of a newborn. Anemia was the most frequent complication (16.2%) in KMC. Anemia may be the consequence of neonatal infection, which is responsible for erythroblastopenia and hyperhemolysis due to microbial toxins [26]. Average discharge weight was estimated at 1570 g. Higher discharge

weights had been reported [27]-[29].

Average discharge weight is not the only criterion for discharge home. Other criteria are taken into account, notably regular weight gain. In this series, we noted an average daily weight gain of 26 g, as reported by other authors [29] [30]. We noted hypothermia in 17% of cases. The frequency of hypothermia varies from study to study [11] [12] [30]-[32]. Good thermoregulation is the key to the success of KMC. Staff should insist on continuous skin-to-skin contact with mothers. Two deaths were recorded (1.5%). KMC helps to reduce LBW mortality, especially when initiated early [28].

## 5. Conclusion

KMC is beneficial for the survival and development of low-birth-weight babies' birth in Côte d'Ivoire. Its introduction into our conditions of practice has shown satisfactory results in terms of weight gain and vital status of newborns. However, there are difficulties encountered in implementing the program effectively and efficiently, including raising the rate of exclusive breastfeeding.

## Authors' Contributions

- Kouakou Cyprien: design, data collection, data entry, data analysis, and drafting of the manuscript.
- Dr. Dainguy: participation in study design and manuscript writing.
- Ake Assi, Kouadio evelyne, Djivohehessoun, Djoman: participation in the writing of the manuscript.
- Folquet A. Conception, reading and revision of the manuscript.

All authors have read and approved the final version of the manuscript.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] United Nations Interagency Group for Child Mortality Estimation (UNIGME) (2022) Child Mortality Levels and Trends: Report 2022, Estimates.
- [2] Lawn J. and Kerber K. (2006) Opportunities for Africa's Newborns: Practical Data, Policy and Programmatic Support for Newborn Care in Africa. PMNCH.
- [3] Institut National de Statistique Abidjan (2021) Enquête démographique et de sante 2021. 17.
- [4] UNICEF (2023) Action Plan Every Newborn Cote d'Ivoire 2018-2020. <http://www.unicef.org>
- [5] Martinez, G., Rey, S. and Marquette, C. (1992) The Mother Kangaroo Programme. *International Child Health*, **3**, 55-67.
- [6] Renfrew, M., Craig, D., Dyson, L., McCormick, F., Rice, S., King, S., *et al.* (2009) Breastfeeding Promotion for Infants in Neonatal Units: A Systematic Review and Economic Analysis. *Health Technology Assessment*, **13**. <https://doi.org/10.3310/hta13400>

- [7] Hake-Brooks, S. and Anderson, G.C. (2008) Kangaroo Care and Breastfeeding of Mother-Preterm Infant Dyads 0 - 18 Months: A Randomized, Controlled Trial. *Neonatal Network*, **27**, 151-159. <https://doi.org/10.1891/0730-0832.27.3.151>
- [8] Johnson, A.N. (2007) The Maternal Experience of Kangaroo Holding. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, **36**, 568-573. <https://doi.org/10.1111/j.1552-6909.2007.00187.x>
- [9] Njiengwe, E., Ndjomo, G. and N-Guifo, O. (2021) Survie du nouveau-né prématuré en l'absence de couveuses à bébés: Bénéfices de la Méthode Mère Kangourou. *Sciences & Bonheur*, **6**, 145-162.
- [10] Menezes, M.A.D.S., Garcia, D.C., Melo, E.V.D. and Cipolotti, R. (2014) Preterm Newborns at Kangaroo Mother Care: A Cohort Follow-Up from Birth to Six Months. *Revista Paulista de Pediatria*, **32**, 171-177. <https://doi.org/10.1590/0103-0582201432213113>
- [11] Worku, B. and Kassie, A. (2005) Kangaroo Mother Care: A Randomized Controlled Trial on Effectiveness of Early Kangaroo Mother Care for the Low Birthweight Infants in Addis Ababa, Ethiopia. *Journal of Tropical Pediatrics*, **51**, 93-97. <https://doi.org/10.1093/tropej/fmh085>
- [12] Ndiaye, O., Diouf, A., Diouf, S., *et al.* (2006) Efficiency of Kangaroo Care on Thermoregulation and Weight Gain of a Preterm Newborn Cohort in Dakar. *Dakar Médical*, **51**, 155-160.
- [13] Conde, A. and Diaz, J. (2016) Kangaroo Mother Care to Reduce Morbidity and Mortality in Low-Birth-Weight Infants. *Cochrane Database of Systematic Reviews*, No. 8, CD002771.
- [14] Azoumah, K.D., Balaka, B., Aboubakari, A.S., Matey, K., Yolou, A. and Agbere, A.D. (2010) Morbidity and Mortality at Kara University Hospital. *Medecine D'Afrique Noire*, **57**, 109-112.
- [15] Bobossi Serengbe, G., Sana Deyamissi, T.S., Diemer, H.C., Gauduelle, A., Gresengue, G., *et al.* (2004) Morbidity and Neonatal Mortality at the Bangui Paediatric Complex. *Médecine d'Afrique Noire*, **51**, 159.
- [16] Goldenberg, R.L., Culhane, J.F., Iams, J.D. and Romero, R. (2008) Epidemiology and Causes of Preterm Birth. *The Lancet*, **371**, 75-84. [https://doi.org/10.1016/s0140-6736\(08\)60074-4](https://doi.org/10.1016/s0140-6736(08)60074-4)
- [17] Ashraf, M., Faraht, M., Mohsen, J., *et al.* (2011) Advantage of Kangaroo Mother Care in Less than 2000 Grams low Birthweight Neonates. *The Medical Journal of the Islamic Republic of Iran*, **25**, 11-15.
- [18] Mosha, D., Chilongola, J., Ndeserua, R., Mwingira, F. and Genton, B. (2014) Effectiveness of Intermittent Preventive Treatment with Sulfadoxine-Pyrimethamine during Pregnancy on Placental Malaria, Maternal Anaemia and Birthweight in Areas with High and Low Malaria Transmission Intensity in Tanzania. *Tropical Medicine & International Health*, **19**, 1048-1056. <https://doi.org/10.1111/tmi.12349>
- [19] Charpak, N., Ruiz-Peláez, J.G. and Charpak, Y. (1997) Kangaroo Mother versus Traditional Care for Newborn Infants  $\leq$  2000 Grams: A Randomized, Controlled Trial. *Pediatrics*, **100**, 682-688. <https://doi.org/10.1542/peds.100.4.682>
- [20] Wang, Y., Zhao, T., Zhang, Y., Li, S. and Cong, X. (2021) Positive Effects of Kangaroo Mother Care on Long-Term Breastfeeding Rates, Growth, and Neurodevelopment in Preterm Infants. *Breastfeeding Medicine*, **16**, 282-291. <https://doi.org/10.1089/bfm.2020.0358>
- [21] Kurt, F., Kucukoglu, S., Ozdemir, A. and Ozcan, Z. (2020) The Effect of Kangaroo

- Care on Maternal Attachment in Preterm Infants. *Nigerian Journal of Clinical Practice*, **23**, 26-32. [https://doi.org/10.4103/njcp.njcp\\_143\\_18](https://doi.org/10.4103/njcp.njcp_143_18)
- [22] Cristóbal Cañadas, D., Parrón Carreño, T., Sánchez Borja, C. and Bonillo Perales, A. (2022) Benefits of Kangaroo Mother Care on the Physiological Stress Parameters of Preterm Infants and Mothers in Neonatal Intensive Care. *International Journal of Environmental Research and Public Health*, **19**, Article 7183. <https://doi.org/10.3390/ijerph19127183>
- [23] Sen, E. and Manav, G. (2020) Effect of Kangaroo Care and Oral Sucrose on Pain in Premature Infants: A Randomized Controlled Trial. *Pain Management Nursing*, **21**, 556-564. <https://doi.org/10.1016/j.pmn.2020.05.003>
- [24] Badr, H.A. and Zauszniewski, J.A. (2017) Kangaroo Care and Postpartum Depression: The Role of Oxytocin. *International Journal of Nursing Sciences*, **4**, 179-183. <https://doi.org/10.1016/j.ijnss.2017.01.001>
- [25] Tasseau, A. and Rigourd, V. (2004) Anémie néonatale précoce: Orientation diagnostique. *Journal de Pédiatrie et de Puériculture*, **17**, 198-203. <https://doi.org/10.1016/j.jpp.2004.04.008>
- [26] Kamaye, M., Garba, M., Mahamane Sani, M., Alido, S., Oumarou, Z. and Amadou, A. (2017) Évaluation de la prise en charge du nouveau-né de faible poids de naissance par la méthode kangourou à la maternité Issaka-Gazoby de Niamey. *Journal de Pédiatrie et de Puériculture*, **30**, 113-117. <https://doi.org/10.1016/j.jpp.2016.12.006>
- [27] Faye, P.M., Thiongane, A., Diagne-Guèye, N.R., Ba, A., Gueye, M., Diouf, S., et al (2016) Les soins kangourou pour nouveau-nés de faible poids de naissance au centre hospitalier national d'enfants Albert-Royer de Dakar. *Archives de Pédiatrie*, **23**, 268-274. <https://doi.org/10.1016/j.arcped.2015.12.010>
- [28] La méthode mère kangourou, abrégé de formation, science et tendresse. <https://www.fundacioncanguro.co/PFMMC/fr/docs/mmk/2.%20LA%20POSITION%20KANGOUROU.pdf>
- [29] Charpak, N., Figueroa, Z. and Ruiz, J.G. (1998) Kangaroo Mother Care. *The Lancet*, **351**, 914. [https://doi.org/10.1016/s0140-6736\(05\)70336-6](https://doi.org/10.1016/s0140-6736(05)70336-6)
- [30] Qintero Romero, S. (2000) Kangaroo Mother Care: Acceptability for Mothers and Health Workers. *Annals of Tropical Paediatrics*, **20**, 22-26.
- [31] Wahlberg, V., Affonso, D.D. and Persson, B. (1992) A Retrospective, Comparative Study Using the Kangaroo Method as a Complement to the Standard Incubator Care. *The European Journal of Public Health*, **2**, 34-37. <https://doi.org/10.1093/eurpub/2.1.34>
- [32] Sivanandan, S. and Sankar, M.J. (2023) Kangaroo Mother Care for Preterm or Low Birth Weight Infants: A Systematic Review and Meta-Analysis. *BMJ Global Health*, **8**, e010728. <https://doi.org/10.1136/bmjgh-2022-010728>