

Kangaroo Care Effects on Brain Maturation and Levels of Oxytocin.

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How will Kangaroo Care Help Mother and Infant?

- Kangaroo care (KC) leads to a release of oxytocin and the infants are at a more mature neurodevelopment level when they experience skin to skin contact during the newborn period (referred to as Kangaroo Care).
- Kangaroo Care has previously shown to increase the rate of autonomic processing and cognitive growth (Feldman, Eidelman, 2003).
- Oxytocin is released during KC, precipitating a bond to form between mother and her infant. Oxytocin is connected to the dopaminergic reward system. Through Kangaroo Care, Oxytocin is released and thus engaging the dopaminergic reward system which gives the mother motivation to bond.(Feldman, 2012).
- A study done by Wolfe and Bell (2007) showed that when infants were given a task to perform they had a higher coherence in the left frontal region that shows better information processing.
- Infants of depressed mothers that are breastfed (and thus given skin to skin contact) till their third month of life were shown to have a higher left frontal EEG asymmetry and infants of depressed mothers that did not breastfeed (and thus had less contact) showed an increase in frontal EEG activity on the right side (Jones et al. 2004).
- Infants that were given Kangaroo Care scored higher on the Bayley Mental Development Index. The Bayley Mental Development Index assesses an infants ability for object constancy, sensory-perceptual abilities, and problem solving (Feldman et al. 2002).

Purpose

- The purpose of this study is to examine the positive effects of Kangaroo Care for both mother and infant.

Hypothesis

- Hypothesis 1:Kangaroo Care will lead to higher levels of oxytocin.
- Hypothesis 2 :Infants that received Kangaroo Care will show signs of greater brain maturation.

Method

Participants

- Urinary oxytocin was collected from 15 women prenatally (GA =30- 38 weeks) and 5 newborns, age range= 1-2 weeks).
- 14 three month old infants were given an EEG reading.

Materials

- Mothers received Kangaroo Care instruction and were given a Kangaroo Care wrap that was worn for at least an hour a day for 3 months.
- Medical Grade neonatal urine collection bags for infants and urine collection containers for mothers.
- EEG Acquisition Software and System by James Long Company.

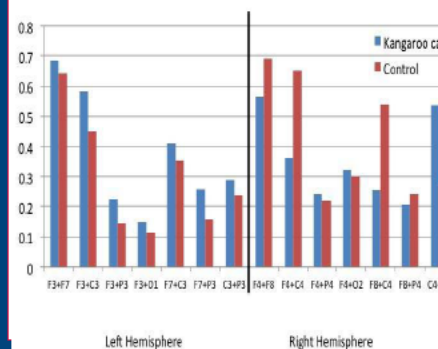
Procedure

- Certified Kangaroo Care Specialist gave mothers in the Kangaroo Care group training on how to properly place their infants in the Kangaroo Care Wrap.
- Urine Collection from pregnant women and their newborns is a reliable method to measure oxytocin levels(Feldman et al. 2010). Therefore urine was collected between 30-36 weeks gestation from pregnant mothers, during the first or second week of birth from infants, and lastly collected from mother and infant after 3 months of birth.
- After urine samples were collected from mother and infant, the samples were stored in an ultra low temperature freezer. (-80° C)
- These urine samples were then analyzed at The University of Wisconsin Primate Lab.
- At three months of age infants came to the Mother Infant Emotion Lab and received an EEG reading by wearing a stretch lycra cap with electrodes inside. A small amount of a water based gel was placed into each recording site to help with conductivity.
- Recordings were obtained from 12 scalp locations and a reference site. Calculations of coherence values were generated from 7 frontal region sites: (Left Hemisphere) F3+F7, F3+C3, F3+P3, F3+O1, F7+C3, F7+P3, C3+P3 (Right Hemisphere) F4+F8, F4+C4, F4+P4, F4+O2, F8+C4, F8+P4, C4+P4.
- EEG data was analyzed at the Florida Atlantic University Mother Infant Emotion Lab using a James Long Company Acquisition and Analysis Software.

Results

- Prenatal oxytocin collection showed a positive relationship between Oxytocin Levels and fetal attachment in the KC group, $r=.93$.
- There is a positive correlation between mothers Oxytocin levels at prenatal and 3 months, $r=.99$.
- There are no effects on infant oxytocin levels yet because this is a longitudinal study and limited infant urine samples were analyzed.
- Kangaroo Care had higher coherence in left frontal region compared to right frontal region.
- A repeated measures MANOVA (7 brain coherence groups across 2 hemispheres and 2 groups (KC or Control)) showed a Hemisphere by Group interaction, $F(1,48) = 7.42, p < .05$ (see figure) and a main effect for coherence group, $F(6,48) = 14.77, p < .05$

Kangaroo Care and Brain Activation



Discussion

- The goal of the study was to examine the potential benefits of using Kangaroo Care during the first 3-months of life. Kangaroo Care is stimulating the slower left hemisphere of the brain. The left hemisphere is known for approach behaviors such as bonding, approach and positive affect (Bell, Wolfe 2007).
- The Kangaroo Care group had a higher coherence in the left region compared to a right frontal region. Having more coherence in the back in the left hemisphere shows a more mature brain.
- The infants in the Control Group had higher communication in the right hemisphere while the Kangaroo Care group had higher communication in the left hemisphere.
- The results for Hypothesis 1 were not supported. Mothers showed a positive correlation of Oxytocin levels collected prenatally and at 3 months.
- As more data is analyzed for infants oxytocin levels it should show a higher level of Oxytocin for those infants in the Kangaroo Care group compared to the control.

References

1. Bell M.A. , Wolfe C.D. (2007)Changes in brain functioning from infancy to early childhood: Evidence from EEG power and coherence during working memory tasks *Development Neuropsychology*, 31, pp. 21 38
2. Feldman R, Eidelman AJ.(2003) Skin to skin contact (Kangaroo Care) accelerates autonomic and neurobehavioral maturation in preterm infants. *Developmental Medicine Child Neurology*. 45:274 281.
3. Feldman R, (2012) Oxytocin and social affiliation in humans *Hormones and Behavior*, 61, pp. 380 391
4. Feldman, R., Eidelman, A. I., Sirota, L., & Weller, A. (2002). Comparison of skin to skin(kangaroo) and traditional care: parenting outcomes and preterm infant development. *Pediatrics*, 110(1),16 26. doi: 10.1542/peds.110.1.16
5. R. Feldman, I. Gordon, O. Zagoory Sharon (2011).Maternal and paternal plasma, salivary, and urinary oxytocin and parent infant synchrony: Considering stress and affiliation components of human bonding. *Developmental Science* , 14 , pp. 752 761
6. Jones N. A., McFall B. A., Diego M. A.(2004) Patterns of brain electrical activity in infants of depressed mothers who breastfeed and bottle feed: The mediating role of infant temperament. *Biological Psychology*, 67:103 24.