

Oxytocin Release is Strongly Associated With Premature Infant Behavioral Patterns

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Background/Significance

There is growing evidence that the premature infant and the developing brain, is influenced especially in the vulnerable window of time the infant is cared for in the Newborn Intensive Care Unit (NICU). It has been optimistically, yet incorrectly, proposed that healthy preterm infants without major complications eventually catch-up developmentally to term infants. Research suggests as preterm infants mature, many remain increasingly disadvantaged on many neurodevelopmental outcomes. Parental touch, especially during skin-to-skin contact (SSC) has the potential to reduce the adverse consequences of prematurity. SSC is an evidenced-based holding strategy that increases parental proximity and provides a continuous interactive environment known to enhance infant physiologic stability and affective closeness between parents and their infants.

Purpose

The purpose of this research study was to examine bio-behavioral mechanisms; and specifically, to evaluate whether infants with higher oxytocin levels have more competent neurobehavioral functioning.

Methods

This randomized cross-over design study used a three-day timeframe conducted in the NICU. The sample consists of 28 stable preterm infants (30 0/7 – 34 6/7 weeks gestational age between 3 -10 days old) and their mothers/fathers. After informed consent, each triad was randomly assigned to one of two sequences: maternal SSC on day one and paternal SSC on day two; or paternal SSC on day one and maternal SSC on day two. Infants' and parents' saliva samples for oxytocin and cortisol were collected pre-SSC, 60-min during-SSC, and 45-min post-SSC. Infant neurobehavioral assessment using the NICU Neurobehavioral Network Scale (NNS) was collected prior to hospital discharge.

Analysis/Results

Data were analyzed using IBM SPSS version 25; descriptive statistics were used to describe demographic characteristic variables. Paired t-tests were used to examine infant salivary oxytocin levels and infant neurobehavioral functioning. Oxytocin release was activated for mothers ($p < 0.001$), fathers ($p < 0.002$) and infants ($p < 0.002$) during skin-to-skin contact. There was also a relationship identified using Pearson's

correlation between infant oxytocin levels and the infant's neurobehavioral functioning. Infant salivary cortisol levels were correlated to summary scales of infant stress behaviors and higher levels of disorganization. Infants held SSC with their mother with higher salivary oxytocin levels had significant correlations to high self-regulatory summary scores ($r = .544$, $p < 0.003$), and a strong negative correlation to excitability summary scores ($r = -.761$, $p < 0.001$). These infants with lower salivary cortisol levels had a strong negative correlation to handling summary scores ($r = .594$, $p < 0.025$) and stress summary scores ($r = -.534$, $p < 0.049$). Infants salivary oxytocin levels, when held SSC by their fathers, had strong correlations with higher self regulatory summary scores ($r = .396$, $p < 0.041$), and a moderate negative correlation with infant lethargy summary scores ($r = -.400$, $p < 0.039$). There was also a moderate correlation for infants held SSC by their fathers with higher cortisol levels to have higher lethargy summary scores ($r = .459$, $p < 0.016$).

Conclusions

Despite advances in the NICU, premature infants remain at risk for adverse neurodevelopmental outcomes. This is an important step in exploring oxytocin as a potential moderator to improve infant neurodevelopmental outcomes and the effects of SSC on mothers, fathers and infants. Nurses can use SSC as a strategy to activate oxytocin and enhance infant developmental outcomes. This study also supports, in conjunction with the views of the American Academy of Pediatrics, the value that all preterm infants and their parents should have the opportunity for SSC every day.

Keywords

Skin-to-skin contact; preterm infant; oxytocin; neurodevelopment; NICU Network Neurobehavioral Scale Statement of Financial Support: The authors have no financial relationships with commercial entities to disclose.

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