Oxytocin increases brain's reward response in women viewing crying infants

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Indiana University researchers studying postpartum depression have found that the hormone oxytocin increased activation in a reward-

sensitive area of the brain when women viewed images of crying infants, but not when they viewed images of smiling ones. The researchers say oxytocin might spark the motivation to help an upset baby.

The new work, published in the journal *Hormones and Behavior* by investigators from the IU Bloomington College of Arts and Sciences' Department of Psychological and Brain Sciences and IU's The Kinsey Institute, gave women in the first sixth months postpartum and women who had never had children either a nasal dose of oxytocin or a nasal placebo. The subjects then viewed images of crying infants, smiling infants, sexual activity and neutral items like nature photos.

Brain activity measured by functional magnetic resonance imaging while the women viewed the images showed that the oxytocin group, regardless of child status, showed a significant increase in activation in the ventral tegmental area, which is associated with the brain's reward circuity, when the subjects viewed the crying infants and sexual images, according to Julia Heiman, a professor in the Department of Psychological and Brain Sciences and senior research fellow at Kinsey who was senior author on the paper.

Oxytocin is a social neuropeptide closely associated with nurturing behaviors like breastfeeding and bonding that also increases in humans with touch and during orgasm. The researchers want to understand how depression affects the processing of the external world during the first six months postpartum, a time when infant development and parental adaptations are rapid and demanding. They also want to know just how decreased motivation toward sexual interests gets balanced between infant demands and the need of most families to maintain and nurture their pair bonds.

Why only crying babies and not the smiling ones? Heiman thinks that most adults have similar reactions to a smiling infant so fewer

differences in "reward" can be found. But oxytocin, especially given its connection to significant reproductive events for women, might facilitate the appeal and motivation to help an upset baby since responding to infant distress is so critical in the early months of life.

"We know there are tradeoffs in terms of sexual responsiveness and in terms of attention to a new infant, who requires care and affection," she said. "What changes during the postpartum period, how these changes positively impact the mother and the infant, and to what extent this nurturing response overrides sexuality, we are learning, depends on a number of influences."

Though the postpartum period is known as a time of less sexual desire for women, this latest study showed variability. Using a scale developed at The Kinsey Institute to measure sexual inhibition and sexual excitation, the postpartum women reported lower desire, more inhibition and less excitation in general. Yet those women who had a higher sexual excitation score also showed more activation in the ventral tegmental area of the brain with visual sexual stimuli when given oxytocin, regardless of whether they were new mothers or never mothers.

"From an evolutionary perspective, this a nurturing period, a time of focus and bonding with a new baby, whose life and future depend on attentive parenting, yet sexual sensitivity does not evaporate," Heiman said. "It just may be less obvious in the first months following birth.

"People forget about the 'other parent' even though between 54 percent and 91 percent of babies in the U.S. are born into married or cohabitating couples," Heiman said. "There remains a lot to uncover about this early phase of life and how the key players adapt. We want to understand what is lost and what is gained in the service of healthy outcomes."

More information: "Oxytocin increases VTA activation to infant and sexual stimuli in nulliparous and postpartum women." *Horm Behav*. 2015 Mar;69:82-8. DOI: 10.1016/j.yhbeh.2014.12.009

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