Psychoneuroendocrinology (2012) 37, 162—166

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SHORT COMMUNICATION

Oxytocin as a moderator of hypnotizability

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Received 19 April 2011; received in revised form 14 May 2011; accepted 16 May 2011

KEYWORDS
Oxytocin;
Suggestibility;
Hypnotizability;
Social bonding

Summary Since hypnosis was popularly recognized in the nineteenth century, the phenomenon of hypnotizability has remained poorly understood. The capacity to increase hypnotizability has important implications because it may increase the number of people who can benefit from hypnotic interventions for psychological and medical conditions. Current theories emphasize that rapport between hypnotist and subject is pivotal to motivate the respondent to engage in strategies that allows them to suspend reality and respond to suggestions. The neuropeptide oxytocin is implicated in social bonding, and enhances a range of social behaviors in animals and humans. This study tested the proposal that oxytocin administration, which enhances social bonding in humans, may enhance hypnotic responding by administering intranasal spray of oxytocin or placebo prior to hypnosis in 40 low hypnotizable male subjects. When low hypnotizable individuals were administered oxytocin via nasal spray, their level of hypnotic responding increased significantly compared to hypnotic responding levels prior to oxytocin administration. This is the first demonstration of a neurochemical basis for hypnotic responding, and points to a potential neural mechanism to explain hypnotizability.

Hypnotized people can experience and behave in ways that defy normal experience, including amnesia, rigidity of the body, regression to one's childhood, and anesthesia. Hypnotizability (i.e., one's capacity to respond to hypnotic suggestion) is normally distributed in the population, with approximately 15% being low hypnotizable, 70% being medium hypnotizable, and 15% being high hypnotizable (Woody et al., 2005). One's capacity for hypnotic responding is very stable across time, with evidence that it remains consistent over 25 years (r = 0.71) (Piccione et al., 1989).

Rapport between hypnotist and subject is pivotal to hypnotizability (Sheehan and McConkey, 1982), arguably because it motivates the respondent to engage in strategies that allow them to suspend reality. Supporting this view, hypnotic responding is modulated by increasing motivation to respond and altering the respondent's expectations (Lynn et al., 2008). Further, hypnotic responding is enhanced by facilitating rapport by altering the hypnotist's behavior (Sheehan, 1980).

The neuropeptide oxytocin plays an important role in social affiliation. Oxytocin is thought to regulate behavior by acting as a neurotransmitter/neuromodulator. Administering oxytocin enhances a range of social behaviors in animals, including maternal nurturing behaviors, pair-bonding, while antagonists of oxytocin impair bonding (Bartz and

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doi:10.1016/j.psyneuen.2011.05.010

Hollander, 2006). In terms of the effect of oxytocin on humans, oxytocin administration enhances trust, as well as increasing attention to social stimuli, enhancing attention to eye regions of the face, and facilitating positive communication following conflict (Kosfeld et al., 2005; Bartz and Hollander, 2006; Guastella et al., 2008).

Oxytocin may enhance social affiliation by several possible mechanisms. Oxytocin may reduce the stress associated with social interactions. Oxytocin dampens the hypothalamic-pituitary-adrenal axis (HPA). Injection of oxytocin reduces blood pressure and cortisol levels in rats, promotes anxiolytic reactions in rats, and increased plasma oxytocin is associated with decreased stress response to a psychosocial stressor in breast-feeding women (Bartz and Hollander, 2006). An alternate mechanism may involve increasing social attention and reward networks during social interactions (Depue and Morrone-Strupinsky, 2005). Evidence that oxytocin enhances attention to social cues during social interactions (Guastella et al., 2008) supports the proposal that oxytocin increases rapport via sensitivity to social cues. On the premise that oxytocin enhances social bonding, and that hypnotizability is facilitated by rapport, we hypothesized that oxytocin would enhance hypnotizability.

1. Methods

1.1. Participants

Hypnotizability was stringently assessed on two occasions prior to oxytocin/placebo administration to ensure that low hypnotizable participants were recruited because they are the most resistant to hypnotic suggestion. We initially screened 850 university students for hypnotizability levels via a group-administered hypnotizability test: the Harvard Group Hypnotizability Scale: Form A (Shor and Orne, 1962). This test is the most commonly used test for initial screening of hypnotizability and comprises a hypnotic induction followed by 12 suggestions (4 motor, 4 challenge, and 4 cognitive suggestions). We employed a 10-item adaption of the self-scored HGSHS:Form A comprising eyes closing, extended arm falling, difficulty lifting arm, difficulty separating interlocked fingers, extended arm difficult to bend, difficulty shaking head ''no'', difficulty opening closed eyes, swatting at a hallucinated fly, touching ankle in response to posthypnotic cue, and amnesia for events in hypnosis (a shortened version was employed to comply with time constraints). Participants who scored in the low range on the HGSHS:A (0—3; $M = 1.21$, $SD = 0.91$) were then re-assessed on a 10-item version of the individually administered experimenter-scored Stanford Hypnotic Susceptibility Scale, Form C (SHSS-C)(Weitzenhoffer and Hilgard, 1962). The SHSS-C is a more rigorous measure of hypnotic susceptibility because (a) it is individually administered, and (b) has a greater proportion of difficult cognitive hypnotic items that require alterations in cognitive experience rather than motor responses. The SHSS:C can categorize responses as 'low' (0—3), 'medium' (4—6), or 'high' (7—10) hypnotizable. We employed a 10-item adaption of this scale that comprised motor (moving hands apart), challenge (difficulty bending extended arm, difficulty lifting arm), and cognitive (swatting a hallucinated mosquito, hallucinating a taste, dream, age regression to school, anosmia to ammonia, hallucinating a voice, and posthypnotic amnesia). Only participants who scored in the range 0—3 on the SHSS:C were recruited for the study. We selected 80 low hypnotizable participants who scored 0—3 ($M = 1.21$, $SD = 0.91$) on the HGSHS:Form A, and 0—3 ($M = 1.76$, $SD = 1.12$) on the SHSS:C. We restricted the sample to males because of potential adverse effects of oxytocin administration on pregnancy. We also excluded individuals with reported allergies to preservatives contained in the nasal spray (viz., E216, E218, and chlorobutanol hemihydrate).

1.2. Procedure

Between 7 and 9 months after the SHSS:C hypnosis testing, participants were contacted and invited to participate in an experiment concerning hypnotic responding. Following written informed consent, participants underwent a brief medical examination to ensure that there were no contraindications for oxytocin administration (no participants were excluded). Participants abstained from alcohol and caffeine on the day of oxytocin administration, and food and drink (except water) 2 h before the oxytocin administration.

Prior to the hypnosis induction, participants were asked to use 7-point Likert scales (1 = *none*, 7 = *extremely*) to rate their (a) anxiety about the hypnosis session, and (b) trust in the hypnotist. Following the dosage used in previous studies that have demonstrated social processes with oxytocin (Guastella et al., 2008), participants then self-administered[1] an intranasal spray of 24 IU oxytocin ($n = 19$) or placebo ($n = 21$). Nasal sprays were developed by a university chemist and involved four puffs of 3 IU in each nostril. Placebo spray involved the same ingredients with the exception of oxytocin (i.e., sorbitol, glycerol, benzyl alcohol, and distilled water). Participants were instructed to wait 45 min until the next phase of the experiment.

A double-blind methodology was adopted and codes were not released by the chemist until the final experimental session was complete. Forty-five minutes after intranasal administration, participants were again asked to rate their anxiety and trust on the same scales, and were administered the SHSS:C that was identical to the previous SHSS:C assessment, and by the same experimenters. That is, the SHSS:C hypnotic induction was administered followed by the same hypnotic suggestions administered at the initial individual hypnosis test. Following the posthypnotic amnesia suggestion, participants were given a deinduction procedure and hypnosis was terminated. Participants were then asked to guess whether they had received oxytocin or placebo prior to hypnosis. Comparable proportions of participants receiving oxytocin (63%) and placebo (52%) believed that they reported oxytocin.

[1] The experimenter modelled administration, with careful instructions concerning head position, grip and position of dispenser, and method of implementing the spray.