No Evidence That Oxytocin Influences Taste Perception Or Food Valuation: Results of A Randomized Controlled Trial

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Introduction

In recent years, there has been growing interest in the hormone oxytocin as a novel target for obesity.[1] Early clinical trials suggest that oxytocin administration reduces food intake. However, it remains unclear what mechanisms underlie this effect.

In this study, **we conducted a randomized controlled trial to examine whether intranasal oxytocin influences two determinants of food intake - taste perception and the subjective valuation of food**.

We hypothesised that oxytocin would:

1. Modify sweet and salt taste perception (by reducing taste thresholds and increasing suprathreshold sensitivity); and
2. Reduce the subjective valuation of food.

Methods

Procedure:

Using a cross-over design, 45 healthy adult males attended 2 study sessions where they received either intranasal oxytocin or placebo (in a counterbalanced order).

Oxytocin Session

- Participants self-administered **two doses of 24IU intra-nasal oxytocin**, spaced 30 mins apart.
- Testing commenced 45 mins into the session, coinciding with the peak windows for plasma oxytocin and for oxytocin-induced changes in regional cerebral blood flow (based on previous research).

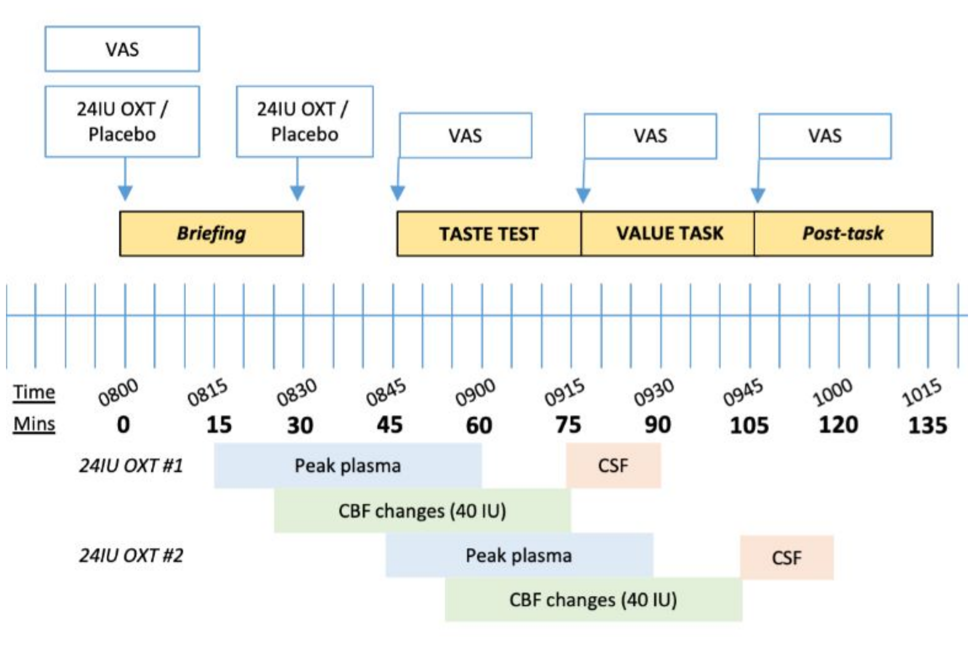


Fig 1. Schematic of study procedures.

Placebo Session

- In the placebo session, all study procedures were identical except that participants received placebo instead of oxytocin.

Taste Perception Tasks

- For each modality (sweet, salt), taste thresholds were determined through 60 trials where solutions of varying concentrations were presented to participants in a pseudo-random order. Concentrations ranged from 300mM to 300μM for sucrose solutions (sweet), and 100-0.2mM for sodium chloride solutions (salt), separated by ¼ log steps.[2]
- Suprathreshold taste sensitivity was determined using general label magnitude scales (gLMS) for the intensity and pleasantness of sucrose and sodium chloride solutions (each ranging from 0.01 to 1.0M, separated by ½ log steps).[3]

Food Valuation Task

- To measure how participants valued food, we assessed their willingness to pay for 144 items (72 food and 72 non-food control items).[4]
- Applying the Becker-DeGroot-Marshak method, participants received S$5 to bid for each item. At the end of the task, a randomly-selected bid was realized.

Results

Oxytocin Did Not Significantly Alter Taste Perception

Taste threshold

- Participants' responses for both the sweet and salt modalities followed standard sigmoidal psychophysics functions.
- However, there was no significant main or interaction effect involving oxytocin (smallest p = 0.15). Based on a two one-sided test (TOST), **taste thresholds following oxytocin and placebo administration were statistically equivalent** (95% CI for difference for sweet: -0.14 to 0.07, $p < 0.001$; salt: -0.09 to -0.002, $p < 0.001$).

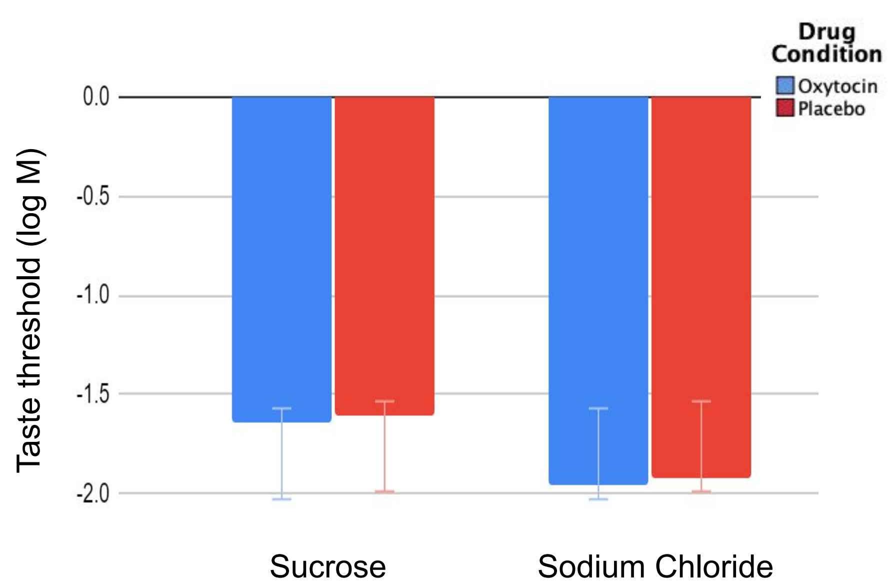


Fig 2. Taste threshold as a function of solution type and drug condition.

Suprathreshold taste sensitivity

- As expected, intensity and pleasantness ratings for both the sweet and salt modalities differed as a function of solution concentration.
- However, **there was no significant main or interaction effect involving oxytocin** (smallest p = 0.28).

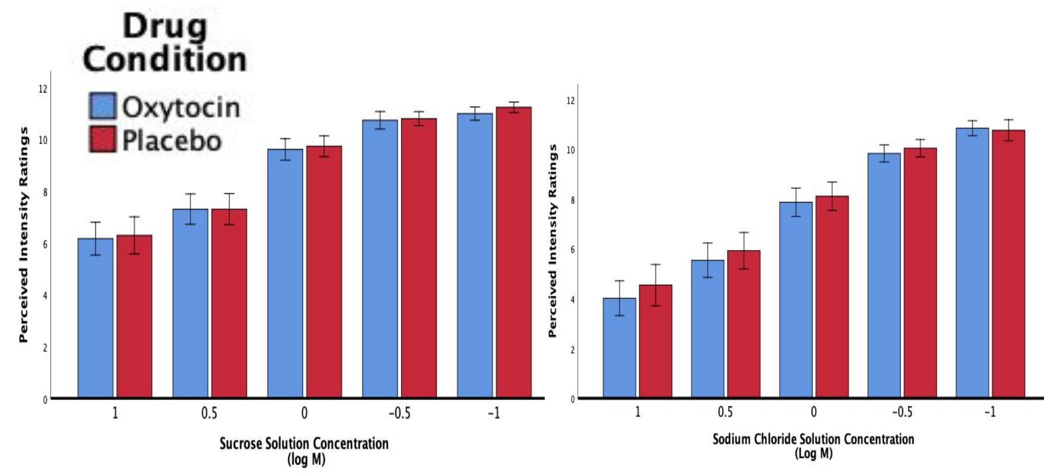


Fig 3. Perceived intensity as a function of solution type and drug condition.

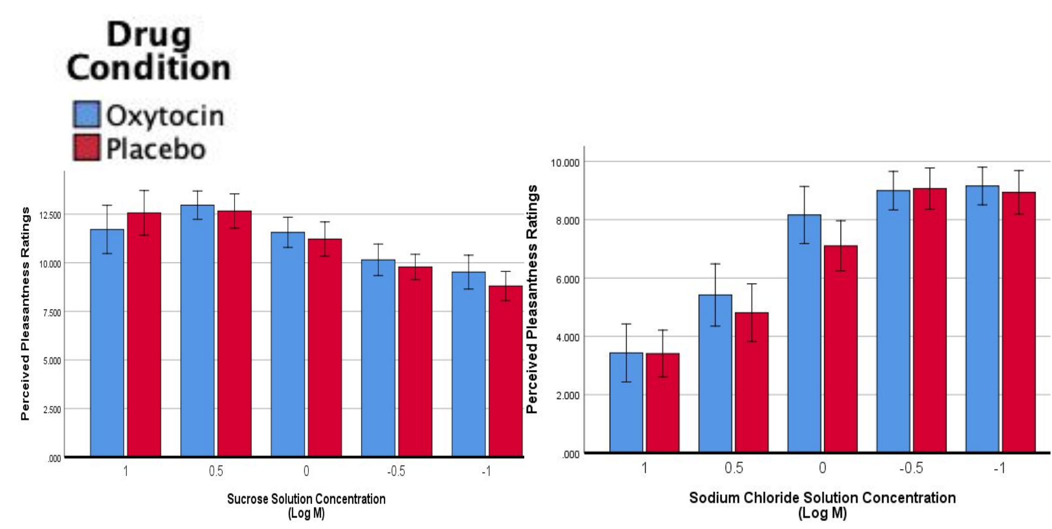
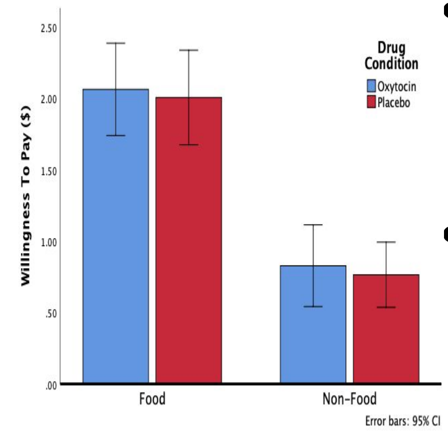


Fig 4. Perceived pleasantness as a function of solution type and drug condition.

Oxytocin Did Not Significantly Impact Food Valuation



- Participants were more willing to pay for food than non-food items ($p < 0.01$).
- However, **there was no significant main or interaction effect involving oxytocin** (smallest p = 0.42).

Fig 5. Food valuation as a function of item type and drug condition.

Conclusions

We found no evidence that oxytocin influences food intake by changing taste perception or the subjective value of food. Future research should explore alternate mechanisms for these effects.

References:

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