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Oxytocin Enhances Visual Attention in Patients with Schizophrenia: Evidence from an Eye-tracking Study

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BACKGROUND

Social cue processing, particularly face perception, plays a critical role in social cognitive functioning. Patients with schizophrenia struggle to extract information from faces and interpret facial expressions (Kohler et al., 2010). Indeed, eye-tracking studies have demonstrated that schizophrenia patients exhibit reduced exploratory behaviour (i.e., reduced number of fixations and longer fixation duration) in response to facial stimuli compared to healthy controls (e.g., Manor et al., 1999), suggesting restricted visual attention. The neuropeptide, oxytocin, has been demonstrated to exert pro-social effects on behaviour and modulate eye gaze during face perception. In this study, we tested whether oxytocin has a compensatory effect on visual processing of human faces.

METHODS

Twenty right-handed male participants with schizophrenia or schizoaffective disorder were administered intranasal oxytocin 40IU or placebo in a double-blind, placebo-controlled, cross-over fashion during two visits separated by 7 days.

Participants engaged in a free-viewing eye-tracking task, looking at images of Caucasian men displaying angry, happy, & neutral facial expressions and control images including animate and inanimate stimuli.

Figure 1. Examples of facial and control stimuli

<table>
<thead>
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<th>Primary outcomes:</th>
<th>Secondary outcomes:</th>
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<tr>
<td>1) Total number of fixations</td>
<td>3) Dispersion</td>
<td></td>
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<tr>
<td>2) Mean duration of fixations</td>
<td>4) Saccade amplitudes</td>
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Repeated-measures ANOVA were carried out to explore the within-subject effects of treatment (oxytocin vs. placebo), stimuli (angry / happy / neutral / animate / inanimate), and the interactions between stimuli and treatment (p < .05, two-tailed).

RESULTS

| Total number of fixations: Main effect of treatment (F(1,17) = 5.604, p = .030); Main effect of stimuli (F(4, 68) = 5.008, p = .001). |  |
| Duration of fixation: Main effect of treatment (F(1,13) = 4.791, p = .047); Main effect of stimuli (F(4,52) = 1.382, p = .253). |  |

Figure 2. Mean Number of Fixations on Oxytocin vs Placebo

| Dispersion: No main effect of treatment; Main effect of stimuli (F(4,68) = 2.998, p = .024). |  |
| Saccade amplitudes: No main effect of treatment; Main effect of stimuli (F(4,68) = 0.289, p = .08). None of the interactions reached significance. |  |

DISCUSSION

In this study, oxytocin enhanced exploratory viewing behaviour by increasing the total number of fixations, whilst reducing the mean duration of fixations compared to placebo. These results indicate that acute administration of intranasal oxytocin has the potential to enhance visual attention and improve social cognitive deficits in schizophrenia (Averbeck et al., 2012). The absence of any interaction effects may warrant future studies into oxytocin-induced eye movement changes and facial emotion recognition in larger samples.