Amygdala Abnormalities in Adults With ADHD

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Abstract

Objective:
The suggested neurobiological bases of ADHD focus on the amygdala as a center of emotions processing. Therefore, we hypothesize that patients with ADHD will show an irregular pattern of emotional-related activity of the amygdala region as well as some structural abnormalities.

Method:
Nine adult patients with ADHD and nine group-matched healthy volunteers were studied using a 1.5-T magnetic resonance imaging (MRI) scanner. Morphometric measurements were obtained manually, and they were later processed and compared. Absolute volumes of several structures and nuclei were calculated with FSL-FIRST. For the functional magnetic resonance examination, a set of two paradigms was prepared, using a block design, incorporating images of the International Affective Picture System (IAPS). The patients were unmedicated at the time of the MRI scan.

Results:
Negative correlation was found between the right amygdala volume and Barrat’s impulsivity scores ($r = -.756, p = .018$). The age of patients did not turn out to be a significant factor. No significantly higher activation areas were found in patients with unpleasant content images. For the left amygdala, an Region Of Interest (ROI)-based analysis showed moderately higher level of activation in the patients than in the controls with pleasant content images.

Conclusion:
Patients with ADHD tend to have smaller amygdala volumes. ADHD patients presented less activation in the area of the left frontal pole than the controls. There was no amygdala activation stated when presenting the pleasant images. Whereas bigger activation of the left amygdala was found in patients while presenting them unpleasant images. These results might suggest that lower emotional processing and less control of impulsivity is associated with dysfunctional amygdala in ADHD patients.