ROI-based VBM study of amygdala and hippocampus in First-episode Treatment Naive Schizophrenia Patients

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Introduction

The gray and white matter deficits in patients of schizophrenia were reported in many MRI structural studies. The medial temporal lobe was on the top of the list (1). But inconsistencies were found in structural difference of amygdala and hippocampus , both are key regions of medial temporal lobe(2、3). It has been proposed that schizophrenia patients with different symptoms may have different structures as their endophenotype (3). In the present study we applied voxel based morphometry (VBM) to investigate the amygdala and hippocampus in patients with first-episode, antipsychotic-naive schizophrenia.

Subjects and Methods

The study was approved by the local ethical committee and written informed consent was obtained from all subjects. All subjects were right-handed. This study recruited 16 patients with the first-episode treatment naive schizophrenia based on DSM-IV, and the patient group was subsequently divided into two subgroups: one with positive symptoms (aged 22.9±11years, 4 males, 4 females) and another with negative symptoms (aged 22.1±8.5 years, 4 males, 4 females), as measured by Positive and Negative Syndrome Scale (PANSS). Meanwhile, eight age and sex matched controls (aged 23.2±7.1 years,4 males,4 females) were also recruited. High-resolution T1-weighted images were acquired for all participants using 3.0T GE EXCITE system (156 continual axial slices, TR/TE: 8.5/3.4msec,Flip angle: 12°, Matrix: 256×256, slice thickness 1mm, voxel size: 0.47×0.47×1.00 mm^3), and were then transferred to workstation for defining ROI and subsequent VBM analysis. The amygdala and hippocampus were manually delineated by three radiologists blinded to the diagnosis. Data processing was performed using Matlab 7.0 (MathWorks, Natick, Massachusetts, USA) and SPM2 (http://www.fil.ion.ucl.ac.uk/spm/software/) to acquire gray matter density in defined ROIs. Statistical evaluation was performed using the software package SPSS for Windows (Version 13.0). An ANCOVA for repeated measures was employed for statistical analysis, and a $\boldsymbol{p}$ of less than 0.05 was deemed significant.

Results

Compared with normal controls, the patient group showed decreased gray matter density in hippocampus and amygdala on both sides (Table 1.) but without statistical significance ($p > 0.05$). In addition, we observed no significant differences in gray matter density of either hippocampus or amygdala when patients with positive symptoms were compared to those of negative symptoms ($p > 0.05$).

Table 1: ANCOVA data of amygdale and hippocampus intensity in controls and patients.

	Controls		Patients			
			Positive symptom		Negative symptom	
	Mean	Std	Mean	Std	Mean	Std
Right amygdala	1384.4	320.1	1107.3	321.6	1222.1	307.7
Left amygdala	1375.8	251.7	1121.5	318.8	1230.0	335.1
Right hippocampus	1737.5	1180.6	1129.7	281.7	1246.1	270.0
Left hippocampus	1714.9	1040.6	1159.1	283.4	1246.0	274.7

Discussion

Small medial temporal lobe volumes have been reported as one of the common findings in schizophrenia patients (4.5), some of them with inconsistent substructural changes (3). However, most studies recruited chronic schizophrenia patients who were on medication. In the present study of patients with first-episode, antipsychotic-naive schizophrenia, we did not observe significantly structural changes of amygdale and hippocampus. It is therefore possible that the observed abnormalities of amygdala and hippocampus as reported in previous studies may mainly attribute to medication and/or subsequent neurodegenerative changes over time. A larger cohort study is necessary to gain further insight into our current findings.

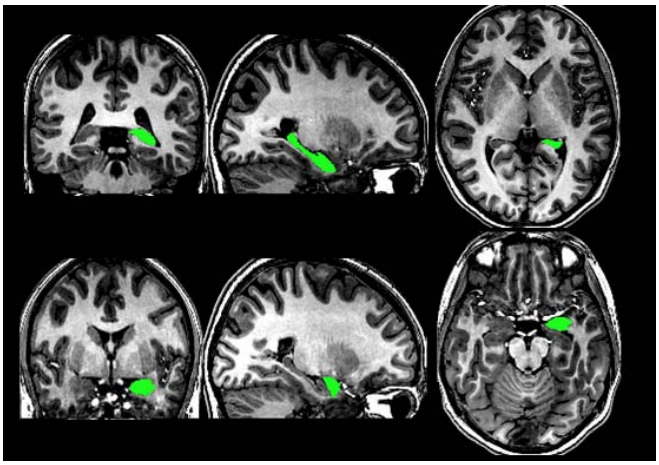

Figure1. The delineation of right hippocampus (upper panel) and amygdale (lower panel) on high-resolution T1-weighted images.

Reference.

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