Amygdala shape differences in patients with Major Depressive Disorder | P.2.b.021

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Background

Imaging studies of Major Depression Disorder (MDD) have shown hyperactivation of amygdala and differences in its reactivity to emotional stimuli. However, volumetric findings are much more heterogeneous [1]. Two potential reasons are:

* Most of the studies do not discriminate patients with distinct long-term outcomes.
* Other structural characteristics apart from volume could exist.

The aim of this study is to analyze shape and volume differences of amygdala in patients with different and well-defined illness stages of MDD.

Results

ANOVA did not show significant differences nor in left (F(3,21)=0.78, p=0.5) or in right (F(3,121)=0.89, p=0.45) ICV-normalized amygdala volumes. (Table 1)

FIRST analyzes indicated shape differences in right basolateral amygdala (ventral nucleus and the most connected with the cortex). p<0.05, cluster corrected. (Figure 1)

<table>
<thead>
<tr>
<th>Table 1. Demographics and amygdala volumes (mm³) of four groups. Means, standard deviations and ratios are provided.</th>
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<tbody>
<tr>
<td><strong>Age</strong></td>
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<tr>
<td>Gender</td>
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<tr>
<td>Right Amygdala</td>
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<tr>
<td>Left Amygdala</td>
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<td>Healthy controls showed shape differences compared to remitted-recurrent patients (A) and to treatment-resistant patients (B).</td>
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Figure 1. Coronal views of T1-MPRAGE images showing shape differences in right amygdala (coloured voxels).

Methods

Participants underwent an MRI (3-Tesla):

- 25 first-episode
- 22 remitted-recurrent
- 21 treatment-resistant
- 62 healthy controls

MDD patients

Structural MRI processing:

* Volume - Left and right amygdala were segmented (Freesurfer v5), and size normalized to total intracranial volume (ICV).
* Shape - FIRST (model-based segmentation/registration tool) of FSL was used.

Statistics - ANOVA of 4 groups:

* Volume - SPSS
* Shape - Vertex analysis (FIRST - FSL5)

Age and gender were introduced as covariates when necessary.

Conclusions

There are structural alterations of the amygdala in advanced stages of MDD.

As these alterations are not present in early stages of the illness, amygdala could be suffering morphological changes as a result of a long-term dysfunction of the emotional processing circuit [2].

These findings agree with the seminal hypothesis of structural volum losses of amygdala and hippocampus as a consequence of glucocorticoid-induced neurotoxicity [3].

Basolateral amygdala is crucial in the expression and regulation of emotion.

A longitudinal study would truly respond whether these differences are a consequence of the disease.

References


Conflicts of interest

V.P. has received educational honoraria from: Sanofi-Aventis, Lundbeck, Pfizer, AstraZeneca and Eli Lilly, and research funding from Boehringer-Ingelheim for this work. E.A. has received consulting and educational honoraria from: Sanofi-Aventis, Lundbeck, and Pfizer, and he has participated as main local investigator in clinical trials from Eli Lilly, Bristol-Myers Squibb, Sanofi-Aventis and also as national coordinator of clinical trials from Servier and Lundbeck.