

# The neuroanatomic difference in grey matter among post-traumatic stress disorder, obsessive-compulsive disorder and social anxiety disorder

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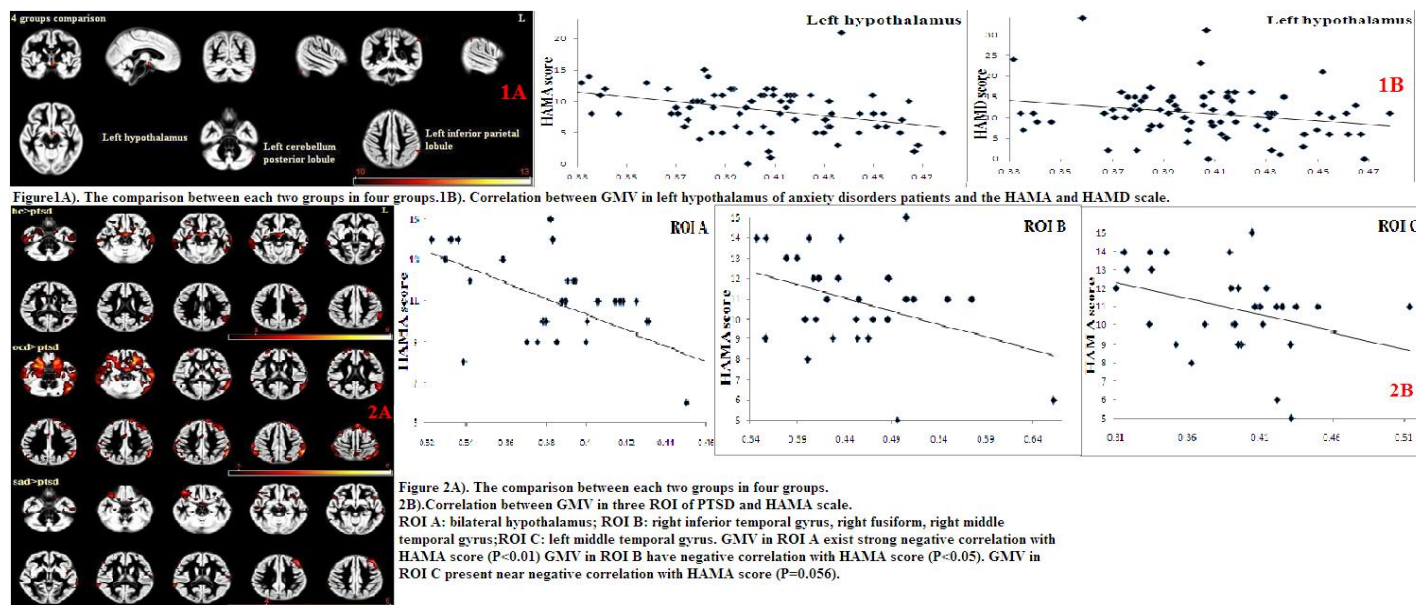
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**Introduction :** Anxiety disorders ranked as one of the most prevalent categories of mental disorder. In Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) generalize anxiety disorder (GAD), panic disorder (PD), phobia disorder (PHD, including social anxiety disorder etc.), obsessive compulsive disorder (OCD), posttraumatic stress disorder (PTSD) are all classified as anxiety disorder given their similar anxiogenic symptom profile [1]. Recently there has been increasing expectations to remove PTSD and OCD from the big category of anxiety disorder in the future DSM-V diagnostic system considering their different pathogenesis and underline mechanism revealed by advanced imaging techniques. Still debate remains for this issue due to their shared anxiety symptoms and similar first line treatment, [2-4]. Past researches had studied the functional and structural differences among anxiety disorders [5, 6]. As cerebral grey matter shall be the fundamental neural basis for brain's function, in present study, we aim to explore the brain neuroanatomical difference by comparing the brain grey matter volume (GMV) among three typical anxiety disorders using the relatively new structural imaging process method, hence, the Voxel-Based Morphometry (VBM) with Diffeomorphic Anatomic Registration through Exponentiated Lie algebra algorithm (DARTEL).

**Methods :** Structural 3.0T MRI scans were obtained from 77 anxiety disorder patients including PTSD (n=30), OCD (n=29) and SAD (n=19) diagnosed according to DSM-IV criterion, and 30 healthy control (HC) participants. Clinical symptoms were evaluated using HAMA, HAMD, CAPS, PCL, YBOCS and LSAS scales respectively. DARTEL and post-hoc analysis were used to compare GMV across the four groups and among each other. Statistical threshold were set at  $P_{\text{cluster-level}} < 0.05$  (FWE-corrected). Region-of-interest analysis was applied to areas showing group differences for correlation analysis with clinical measurements.

**Results :** The GMV among four groups differ significantly in left hypothalamus, left inferior parietal lobule and left cerebellum posterior lobe (Figure 1A). Further post hoc T test analysis revealed differences of GMV between only PTSD and all other three groups ( $p < 0.05$ , Figure 2A). GMV in left hypothalamus of anxiety disorder show negative correlation with HAMA scale ( $p < 0.01$ ) and near negative correlation with HAMD scale ( $p = 0.051$ ) (Figure 1B). Besides, within PTSD patient, GMV in bilateral hypothalamus ( $p < 0.01$ ) and right inferior temporal gyrus, right fusiform, right middle temporal gyrus showed negative correlation with HAMA scale ( $p < 0.05$ ), while left middle temporal gyrus shows a trend of negative correlation ( $P = 0.056$ ) with HAMA scale (Figure 2B).

**Discussion and Conclusion :** For the first time, we revealed PTSD demonstrate distinct neuroanatomical difference from OCD and SAD through grey matter volume comparison, which may give direct evidence for its detachment from anxiety disorder. Besides, decreased GMV found in left hypothalamus of all anxiety disorder patients and specific regions in PTSD patients showed correlation with the symptoms severity, which may provide new target for the clinical treatment.



## Abstract:

1. Association, A.P. and A.P.A.T.F.o. DSM-IV., *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. 2000: American Psychiatric Publishing, Inc.
2. Resick, P.A. and M.W. Miller, *Posttraumatic stress disorder: Anxiety or traumatic stress disorder?* Journal of Traumatic Stress, 2009. **22**(5): p. 384-390.
3. Storch, E.A., J. Abramowitz, and W.K. Goodman, *Where does obsessive-compulsive disorder belong in DSM-V?* Depression and Anxiety, 2008. **25**(4): p. 336-347.
4. Yin, Y., et al., *Abnormal baseline brain activity in posttraumatic stress disorder: A resting-state functional magnetic resonance imaging study*. Neuroscience letters, 2011.
5. Qiu, C., et al., *Regional homogeneity changes in social anxiety disorder: a resting-state fMRI study*. Psychiatry Research, 2011. **194**(1): p. 47.