Ruprecht-Karls-Universität Heidelberg

Medizinische Fakultät Mannheim

Dissertations-Kurzfassung

Hippocampal and amygdalar volumetry in female borderline patients utilizing magnetic resonance imaging, manual volumetry and voxel based morphometry

Autor: Kevin Oliver Berne
Institut / Klinik: Zentralinstitut für Seelische Gesundheit Mannheim (ZI)
Doktorvater: Priv.-Doz. Dr. Ch. Schmahl

To further the insight and understanding of borderline personality disorder, this study was performed to reliably ascertain the morphologic status of the affected patients in terms of hippocampal and amygdalar volume utilizing appropriate imaging technology as well as new volumetric software and analytical algorythms. The large sample size and the application of both manual and semi-automatic volumetric protocols enabled this study to investigate BPD in a realistically configured sample of female patients with and without comorbid PTSD.

With the general consensus of the previously conducted studies being that the hippocampal and possibly even the amygdalar structures were significantly reduced in size in BPD patients compared to healthy control groups, both manual volumetry performed by a single trained rater blind to the subjects' identities and voxel-based morphometry were conducted on a total of 50 human brains. The image data was (pre)processed utilizing several programs including MRIcro for compatibilization, BrainSuite2 for total brain volume calculation, BRAINS2 for manual volumetry, SPM MATLAB for voxel-based morphometry and SPSS for statistical analyses. Considering the first of the hypotheses in this study, stating BPD patients to have smaller hippocampal volumes adjusted for total brain volume compared to healthy controls, only manual volumetry revealed a trend in the patient group for smaller right hippocampi. Considering the second hypothesis, both manual and semi-automatic VBM failed to detect a difference in amygdalar volume between the two groups. However, concerning the third and final hypothesis theorizing comorbid PTSD in borderline patients to cause hippocampal volume decrease, manual volumetry revealed BPD patients also suffering from lifetime PTSD comorbidity to have significantly smaller left hippocampi as well as a trend for smaller right hippocampi. Furthermore, concerning BPD patients also suffering from current PTSD, significantly larger right amygdalae as well as a trend for larger left amygdalae were detected. Additionally, the patient group displayed a significant positive correlation between bilateral amygdalar size and impulsiveness as assessed with the Barrat Impulsiveness Scale Score. Another significant positive correlation was detected between left amygdalar volume and the borderline symptom list (BSL) score, with these findings thus suggesting an increase in amygdalar volume indicating a stronger BPD symptom severity. Furthermore, a trend for a positive correlation between right hippocampal volumes and impulsiveness as assessed utilizing the BIS was detected.

With the pathological processes underlying BPD not being completely understood and the establishment of a reliable and pathophysiologically sound study design still being debated, further studies on the subject of brain volumetry in BPD patients are warranted.