

A Comparative Study of White Matter Structural Integrity Through Diffusion Tensor Imaging Tractography in Bipolar Disorder Patients Compared to First Degree Relatives and Healthy Controls

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Objective

To compare the white matter structural changes in specific axonal tracts detailed by diffusion tensor imaging (DTI) tractography in patients of bipolar disorder I, non-ill first degree relatives of the patients, and healthy controls in Indian population.

Methods

In a cross sectional study, we studied right-handed subjects consisting of 15 euthymic bipolar disorder I patients, 15 first degree relatives and 15 healthy controls. White matter tracts, including the anterior thalamic radiation, uncinate fasciculus, corpus callosum, and cingulum bundle were reconstructed by DTI tractography. Mean fractional anisotropy (FA) values were compared for group differences followed by post hoc analysis.

Results

The three groups did not differ in terms of socio-demographic variables. There were significant group differences in the FA values between the bipolar disorder I, first degree relatives and the healthy control groups for corpus callosum ($H=35.922$, $p<0.001$), dorsal part of right cingulum bundle ($H=23.562$, $p<0.001$), hippocampal part of right cingulum bundle ($H=8.992$, $p<0.001$), hippocampal part of left cingulum bundle ($H=26.034$, $p<0.001$), right uncinate fasciculus ($H=33.563$, $p<0.001$) and left uncinate fasciculus ($H=34.093$, $p<0.001$). No significant difference was found between the groups for FA values of dorsal part of left cingulum bundle and right and left anterior thalamic radiations. FA values were significantly lower in bipolar disorder I patients as compared to family control group which in turn had significantly lower levels, compared to healthy controls.

Conclusion

The findings suggest that bipolar disorder patients and their first degree relatives show alterations in microstructural integrity of white matter tracts, compared to healthy population.