

Article: 0291

Topic: EPO02 - e-Poster Oral 02: Cultural Psychiatry, Epidemiology and Social Psychiatry, Forensic Psychiatry and Neuroimaging

High Potency Cannabis Affects Corpus Callosum (CC) Microstructural Organization

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INTRODUCTION: High potency cannabis has been associated with greater risk, and earlier onset of psychosis. However, its effect on brain structure, particularly white matter (WM), has never been explored.

OBJECTIVES AND AIMS: To elucidate the interplay between cannabis potency, pattern of use (frequency and age of first use) and CC microstructure; in patients with first-episode psychosis (FEP) and healthy controls.

METHODS: 56 FEP and 43 healthy controls underwent Diffusion-Tensor Imaging combined with WM mapping-tractography. CC was virtually dissected and segmented to calculate Fractional Anisotropy (FA), Mean Diffusivity (MD), Axial Diffusivity (AD) and Radial Diffusivity (RD) for each CC segment.

RESULTS: High potency cannabis users had higher Total CC MD and Total CC AD than both low potency users and those who never used ($p=0.009$ and $p=0.02$ respectively). Daily users also had higher Total CC MD and Total CC AD than both occasional users and those who never used ($p=0.02$ and $p=0.01$ respectively). Furthermore, daily/highpotency users had higher Total CC MD than those who never used or used weekly [$F(2,57)=4.7$, $p=0.01$]. There was no effect of diagnosis or diagnosis X potency/patterns of use interactions; neither differences between users who started before the age of 15 and those who started later were detected, in any diffusivity measures.

CONCLUSIONS: Frequent use of high-potency cannabis significantly affects callosal microstructure, regardless of the presence of a psychotic disorder. Given the increased availability and use of high potency preparations in Europe, raising awareness about some of their detrimental effects is an important avenue to pursue.