Imaging biomarkers in early parkinson's disease using diffusion tensor imaging and fractional anisotropy values in the brain grey and white matter

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Abstract

Background: Diffusion tensor imaging (DTI) appears as a sensitive method to study Parkinson's disease (PD) pathophysiology and severity. Fractional anisotropy (FA) value is one of the scalar derivatives of DTI used to find out anisotropy within a voxel in a tissue and used for determining white matter integrity in aging and neurodegenerative diseases. We studied DTI derived FA in early PD subjects as their routine MRI scans were normal.

Methods: 40 patients with early PD and 40 healthy controls were employed to evaluate changes in microstructural white and grey matter in the brain's using DTI derived FA values. Comparison of FA values in the brain's white and grey matter of patients with PD and age matched controls at the corpus callosum, centrum semiovale, pons, putamen, caudate nucleus, substantia nigra, cerebral peduncles and cerebellar peduncles, was done using a region of interest (ROI) technique, with b-value $1000s/mm^2$ and TE=100 milliseconds using 1.5T MRI system.

Results: PD patients showed differences in FA values in both the grey and white matter areas of the brain's compared to healthy controls. Our study revealed the presence of damage in the substantia nigra, corpus callosum, putamen and cerebral peduncles mainly in the PD group.

Conclusion: Our findings indicate that DTI and region of interest (ROI) methods can be used in patients with early PD to study microstructural alterations mainly in the substantia nigra, putamen and corpus callosum.

Biography:

Dr. Rahul P Kotian, Professor In Medical Imaging., Ph.D., MSc MIT, BSc MIT is a doctorate in Magnetic Resonance Imaging who received his Ph.D., degree from Manipal College of Health Professions, Manipal Academy of Higher Education, Manipal, Karnataka, India where he also won the best outgoing student award at the graduate and post-graduate level. He is currently working as the Principal at NIMS Paramedical College, NIMS University, Jaipur, Rajasthan, India. He has contributed extensively to the world medical imaging literature with 37 publications appearing in scopus indexed and springer nature publications. He is recognized international leader in the field of Medical Imaging in DTI and FA imaging in Parkinson's disease.

Speaker Publications:

1. "A diffusion tensor imaging study to compare normative fractional anisotropy values with patients suffering from Parkinson's disease in the brain grey and white matter".
2. "Estimating the proportion of bone mineral density loss in patients with normal kidney function among South Indian population".
3. "Correlation Of Bone Mineral Density Measured In Quantitative Computed Tomography With Hounsfield Unit".

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