Peak Width of Skeletonized Mean Diffusivity as a Marker of White Matter Injury Predicts Cognition in Frontotemporal Dementia

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Background and Aims

- Vascular contributions to neurodegenerative diseases especially dementia are increasingly recognised.
- Peak width of skeletonized mean diffusivity (PSMD) is a novel marker of white matter injury due to cerebral small-vessel disease.
- In the background of high vascular risk in India, the impact of cSVD on aging and other neurodegenerative diseases remains to be investigated.
- This study aims to understand the relationship between PSMD and cognition in ageing and frontotemporal dementia (FTD).

Methods

- Eighty cognitively normal (CN) individuals above the age of 40 years and fifty FTD patients were included.
- ACE– III was administered to evaluate global cognition, attention, memory, fluency, language and visuospatial abilities.
- Diffusion MRI were acquired using a standard protocol on a 3T SIEMENS Skyra scanner.
- Tract-based spatial statistics on FSL was used to process the images.

Results

- FTD group had significantly higher PSMD values compared to cognitively normal controls ($p<0.001$).
- PSMD correlated positively with age in both controls ($r=0.499$, $p<0.001$) and FTD ($r=0.333$, $p=0.018$).

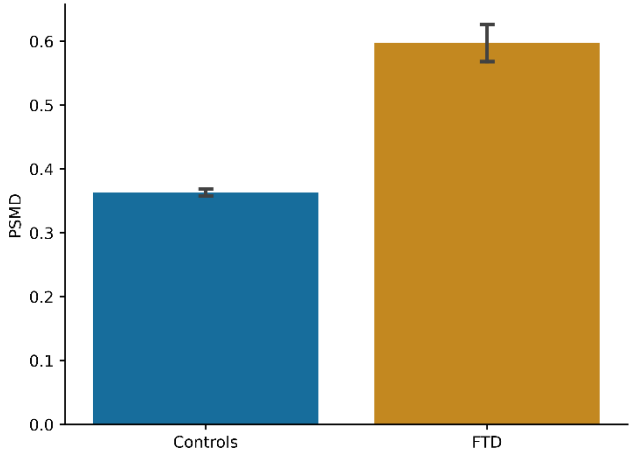

Figure 1. Higher PSMD in FTD compared to controls

- In FTD, PSMD predicted global cognition ($R^2=0.281$, $p<0.001$), attention ($R^2=0.226$, $p<0.019$), memory ($R^2=0.216$, $p=0.028$), fluency ($R^2=0.234$, $p=0.006$) and language ($R^2=0.333$, $p=0.004$) after controlling for age, gender and education.

Results

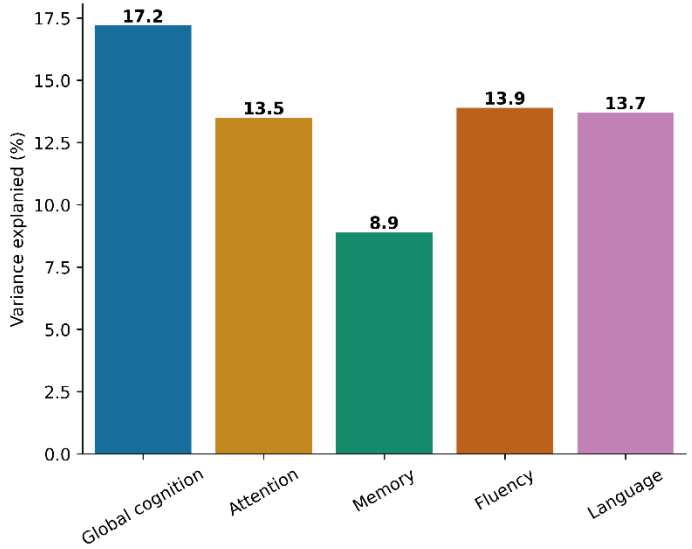

Figure 2. Variance of PSMD among FTD explained by cognition

Discussion

- With aging, the PSMD values increase.
- This could be due to white matter injury that can be attributed to an increase in cerebrovascular burden with age.
- An increase in PSMD values predicts cognitive changes in FTD patients, independent of age, gender and education.
- PSMD can be a marker of white matter injury and cognitive decline in dementia.