Prognostication of Psychosis Based on Artificial Intelligence Volume Analysis of MRI Brain

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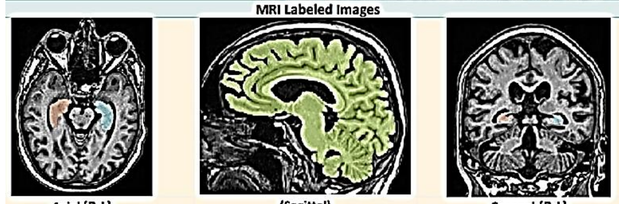
Background: Psychosis is a group of disorders, not only difficult to diagnose & manage but also prognosticate. For long it has been proved that psychotic patients show reduction in cognitive powers especially if untreated or partially/intermittently treated. This reduced cognition has been linked to neurodegeneration responsible for the atrophy of multiple brain structures causing reduction in overall whole brain volume. Hence, we planned a pilot study for evaluation of the above fact using Artificial Intelligence (AI) Based Volumetric Analysis of MRI Brain.

Methodology: Twenty-five patients with proven psychosis and on treatment for more than six months underwent MRI brain on 1.5T scanner followed by MRI brain volumetric analysis using AI based tool. The volumetric data thus obtained was then compared with age & sex matched 25 control subjects.

Results: Nearly two-third patients (17/25) revealed some degree of whole brain volume loss in brain and one-third (6/17) of them showing significant degree of volume loss which correlated well with the poor control of their disease. WBV/ICV ratio was lower in cases than controls.

ICV	1360.82
WB	1021.68
Volume Loss	WHOLE BRAIN VOLUME LOSS IS 78.48 ML.
Percentage	WHOLE BRAIN VOLUME LOSS IS 7.13%.
Output	WHOLE BRAIN VOLUME LOSS IS PRESENT. PONS AND BRAINSTEM VOLUMES ARE AT 25TH PERCENTILE ACCORDING TO ICV. BILATERAL HIPPOCAMPAL VOLUMES ARE WITHIN RANGE. VENTRICULAR VOLUME IS 40.34 ML. MIDBRAIN VOLUME IS WITHIN RANGE WHEN NORMALIZED WITH ICV. MIDBRAIN TO PONS RATIO IS 0.53 (MIDBRAIN: 208 mm², PONS: 388 mm²)

MRI Labeled Images



Axial (R-L) (Sagittal) Coronal (R-L)

AI report in a patient

- Intra-Cranial volume (ICV) in *controls* was as follows:
  - Males: 1400-1500mL
  - Females: 1200-1300mL
- Intra-Cranial volume (ICV) in *cases* was as follows:
  - Males: 1400-1500mL
  - Females: 1200-1300mL

ICV in Controls vs Cases

- Whole Brain volume (WBV) in *controls* was as follows:
  - Males: 1200-1300mL
  - Females: 1100-1200mL
- Whole Brain volume (WBV) in *cases* was as follows:
  - Males: 1150-1225mL
  - Females: 1000-1075mL

WBV in Controls vs Cases

- Ratio of WBV to ICV in controls was as follows:
  - Males: 0.85-0.87
  - Females: 0.90-0.92
- Ratio of WBV to ICV in cases was as follows:
  - Males: 0.80-0.82
  - Females: 0.82-0.84

WBV/ICV Ratio in Controls vs Cases

Conclusions: AI based volumetric analysis of brain can be very useful in objectively identifying patients with poor prognosis and faster progression helping in better management and determining the need of aggressive management and psycho-counselling. It may also aid in research of such drug molecules which can objectively reduce the progression of brain atrophy.

References:

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