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Evaluation and objective characterisation of Brain function by quantitative EEG in normal controls and patients of major Depressive Disorder

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Introduction: EEG Signal Processing: Signal processing is the enabling technology for the generation, transformation, and interpretation of information. At different stages of time our brain reacts differently. These brain signals used for various purposes so that it is possible to study the functionalities of brain properly by generating, transforming and interpreting the collected signal. This process is known as brain signal processing. Researchers have focused on brain signals since the beginning of the last century and several attempts to understand and interpret those signals have been proposed. Characteristics of EEG Wave Bands: The EEG signal is traditionally divided into spectral broad frequency bands related to EEG generators and rhythms: delta, theta, alpha, and beta.

Objective:

- To evaluate and characterise brain electrophysiology by quantitative EEG in normal controls and patients of major depressive disorder
- To assess the efficiency of quantitative EEG in studying brain electrophysiology
- To correlate qEEG parameters with clinical scoring parameters in assessing brain electrophysiology in major depressive disorder
- To evaluate the event related potential against visual and auditory stimuli in major depressive disorder as compared to normal controls
- To compare qEEG parameters in major depressive disorder with that of in schizophrenia and obsessive compulsive disorder

Methodology: Recording procedure: Regular EEG will be recorded with routine Bipolar and Referential montages. Along with that, a registry of the long latency event-related potentials will be carried out with visual and auditory task (Sternberg paradigm, 1966). Both memory task and reaction time evaluation should be conducted. Data mining: The digital

data of the subject specific (both Control and Case) EEG time series were retrieved and archived in specific drive destination, in ASCII format. They were categorised in accordance with their independent variable. Descriptive: Analysis of the amplitude, duration, latency, phase of the different waves were first carried out manually and with the cursor on the screen, identifying each one of the waves visually, paying attention to both the negative as well as positive inflections that occur sequentially to the stimulation performed, with an analysis window of 1,000 msec from the onset of the visual stimulus. Necessary rejection of the artefacts was carried out.

Objective: The digital data of the subject specific EEG time series will be analysed using standard software algorithm in MATLAB platform. Another option EEGLAB tool box, which is an open source utility for analysis of EEG dynamics, can be used. Statistical analysis: The statistical analysis of the results will be performed by using different statistical designs; depending upon the characteristics of the variables, and inter-relation between them. Implications: Quantitative EEG (qEEG) deals with the evaluation of the brain electrophysiology for objective characterisation of the wave pattern and extraction of the embedded information, utilising standard and customised software tools and mathematical algorithm to undertake various transformation procedures to decompose the complex brain signals, both in time-domain and frequency-domain analysis platform. Major Depressive Disorder (MDD) has been associated with alterations in cognitive function as well with memory and attention problems; the neurophysiological mechanisms of which are still unknown. Characterisation of brain electrophysiology by qEEG in MDD patients by correlation of qEEG parameters with clinical scoring parameters will likely elucidate the underlying mechanism.

Speaker Biography

Tamal Basak is a final year medical student of Medical College, Kolkata, India. He has actively participated in the several health camp organised by South Asian Medical Students' Association. He has participated in ICMR- STS programme in 2016.

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