**Connectivity Problems in Children with Intellectual Disabilities (ID)**

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**Introduction**

This article highlight the importance of understanding the neurological basis of the children with intellectual disabilities (ID) by analysing their brain wave frequencies obtained from EEG recordings. The mild intellectual disability children tend to have more delayed development in academic, social, and adaptive skills as reflected in low achievement across content and skill areas as well as lower scores on measures of intelligence and adaptive behaviour. The brain topography were obtained from Quantitative Electroencephalograph (QEEG) which was used as a tool to record the electrical activity within the brain channel and to look at the dynamic changes taking place throughout the brain. The brainwave depicted in the electrical activities of the brain produced electrical pattern known as brainwave pattern. These pattern indicates whether the area of the brain function properly and efficiently or to look at the hypoconnectivity and hyperconnectivity in various areas of the brain.

**Method**

In this research, two participants with mild intellectual disabilities were purposely selected for analysis of brain topography acquired from QEEG. Both participants volunteered for the Neurofeedback Training and thereafter QEEG was conducted before the application of the suggested protocol by the expert. The informed consent and relevant information related to their medical history and cognitive performance were obtained from their parents.

**Instrumentation**: Quantitative electroencephalograph **(QEEG)** were used to record the electrical activity of the brain in order to obtain the brain topography of the participants for analysis.

**Findings and Discussion**

The following two cases of ID children provide exemplars on the use of QEEG to analyse the connectivity problems and brain functioning of mild ID children.

**Case 1**

Figure 2 displays the result of topographical mappings for case one (participant A) and Figure 3 for case two. The EEG data were artifacted (muscles, eye and other artifacts) and removed from the data sets before converted with digital filtering. Analysis were performed and converted into topographical maps for visual display purposes.



Figure 2: Brain topography of Participant A

 From the brain topography (Figure 2), the subject was detected to have excessive presence of Delta wave activity at the occipital lope and left prefrontal lobe or roughly correlating with O1,O2 and FP1 based on the International ten twenty system (Jasper, 1958).

Most of the point showed low frequency of Beta and Gamma wave activity. There were insufficient presence of beta in most of the regions as shown in Figure 2.

**Case 2**



Figure 3: Brain topography of Participant B

The brain topography in the above Figure shows an excessive delta wave at FP1 – Fp2.) This indicates the focal lesion in the area that might result in hypofunction (decreased function) or constellations of other cognitive impairment. Excess delta at FP1-FP2 is associated with the participant’s **inability to focus, and cannot sustain attention while given the cognitive task such as block design or mathematic’s exercise.**

The participant’s brain mapping showed insufficient presence of alpha in most of the regions such as frontal, temporal and parietal. Alpha thus represents non- arousal ranges from 8-12 Hz. .

**Conclusion**

QEEG provides digital reading from the scalp based on electrical patterns of the cortex (Gerald, 2006) Generally the two participants show insufficient rang of Beta and Alpha wave that shows less connectivity between the different regions of the brain.

**Significance**

The report shows the connectivity problems in children with ID problems as displayed by the brain topography.There were increases in delta frequencies at the frontal lobe (FP1-Fp2) and decreases in Alpha and beta frequencies at the posterior regions. It is crucial that the individuals need to normalize the abnormal EEG frequencies to address the connectivity problems.

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