

Summery

Introduction:

This study aimed to investigate the efficiency performance of frontal lobe executive functions in Down syndrome children by comparing their result with mental age children, and to assume a profile for component of executive functions compare with mental age level of mental age children (comparing group). and assessment the efficiency of frontal lobe in down syndrome children by evaluating the beta relative value for (F3, Fz, F4 electrode) in EEG rhythm, and relation to Executive functions by evaluate the beta relative value for (F3, Fz, F4 electrode) in EEG while performance on tests of Executive function. and assessment the difference between right frontal lobe and left frontal lobe in power of beta relative value while performance in executive functions tests.

Questions:

- 1- Are there significant differences between children with Down syndrome compared to children with the same mental age in the efficient frontal lobe executive functions (Visuo- spatial sketchpad of working memory, inhibition, and ability to planning, ability to sustained attention) and the level of this performance?
- 2- Is there a correlation between performance of executive functions, and the activity of the frontal lobe of the brain?
- 3- Are there differences in the efficiency of the performance of the frontal lobe of the brain in children with Down syndrome compared to the children who are identical with them in the mental age?
- 4- Are there differences in the strength of the spread of beta waves between the right frontal lobe and the left frontal lobe in the case of Down syndrome child compared to healthy children through performance in tests of executive functions?
- 5- Is there difference in cognitive profile performance of executive functions in Down syndrome compared with the same mental age children?

Participants:

Down syndrome group: consisted of 20 children with Down syndrome (15 male, 5 female), and their ranged mental age 3.3 years to 6.3 years.

Compare group: consisting of 20 children without mental disability (15 male, 5 female), and their age 3.3 years to 6.3 years, identical with Down syndrome in mental age.

EEG experiment group: consisted of a child with Down syndrome, and a healthy child (compare case) equivalent to a child with Down syndrome in mental age.

Tools:

In this study, we used the following tests to measure component of executive function as:

- 1- Matching test, the study used drawing man test to match between the Down syndrome children and normal children in mental age.
- 2- Battery to evaluate the Executive function (working memory Visuo-spatial sketch pad test, the day-night stroop test for inhibition ability, the wood maze test for planning ability, sustain attention test) designed by scholar.
- 3- Used the Electroencephalogram (EEG) to record power of beta waves (12-24 Hz) in frontal lobe for third group. (Case study).

Statistical Analysis:

This study used:

Kurtosis and skewness coefficient, The Pearson's correlation coefficient, Mean and standard deviation, and the Mann-Whitney test

Results:

-The present study revealed that Down syndrome children show dysfunction in executive function (Visuo- spatial sketchpad of working memory, inhibition, ability to sustained attention) , and decrease in performance compared with mental age children, However, there are not difference in the ability of planning between Down syndrome child and mental age child.

-The EEG rhythm and beta relative value record revealed that, There are relation between executive functions performance and frontal lobe activation, and Down syndrome children appear strong decrease in beta waves of frontal lobe while performance in executive functions tests compare with identical mental age children.

-The present study revealed that Down syndrome children show weakness in working memory and inhibition, and there is dysfunction in the planning ability. Moreover, they are face challenge to concentrate in continue stimulus, so they appear weak sustain attention ability. However, they appear little improve in visual- spatial ability compare to other abilities.