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ANALYSIS OF BRAIN ACTIVATION IN TEENAGERS WITH ISOLATED DYSORTHOGRAPHY (SPELLING DISORDER) AND GOOD SPELLERS DURING A SPELLING ASSESSMENT TASK

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SUMMARY

Background:

There has been little research on the neural correlates of writing in children and teenagers. The purpose of the present study was to describe brain activation in a group of teenagers with isolated dysorthography vs. teenagers with good spelling skills, during a task involving the assessment of spelling accuracy in words containing an orthographic difficulty. The results will allow for conclusions relating to neural mechanisms underlying the isolated developmental disorder connected with learning to spell correctly.

Material/ Methods:

The participants included 15 subjects with isolated dysorthography and 14 good spellers, aged 13-15. An fMRI examination was performed to obtain data on brain activation prompted by visually presented words (correctly and incorrectly spelled). The participants were asked to judge if the words were spelled correctly or not.

Results:

The group with dysorthography was found to activate a total of 18 clusters, while the controls activated 7 clusters. An analysis of the tables shows that the structures activated in the two groups do not overlap. In the group with dysorthography, posterior and anterior cortical areas were activated, while in the control group activation was found mainly in the cerebellum. Both groups showed activation in the middle occipital gyrus; however, in the controls this was in the left hemisphere, while in the subjects with dysorthography it was in the right hemisphere. The cerebellum was active only in the controls.

Conclusions:

Cerebellar deficit may be one of the significant mechanisms leading to learning difficulties manifesting as isolated spelling disorder

Key words: fMRI, cerebellum, interior frontal gyrus, parietal lobe, accuracy of spelling, automatization