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Analysis of Autoantibodies to the S-100 Protein, NMDA, and Dopamine Receptors in Children with Type 1 Diabetes Mellitus

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Abstract : Aim of the study: The aim of the study was to perform a comparative analysis of the levels of autoantibodies (AAB) to the S-100 protein as well as to the dopamine and NMDA receptors in children with type 1 diabetes mellitus (DM) in therapeutic remission. Materials and methods: Blood serum obtained from 42 children ages 4 to 17 years (20 boys and 22 girls) was analyzed. Twenty-one of these children had a diagnosis of type 1 DM and were in therapeutic remission (study group). The mean duration of disease in children with type 1 DM was 9.6±0.36 years. Children without DM were included in a group of "apparently healthy children" (21 children, comparison group). AAB to the S-100 protein, the dopamine, and NMDA receptors were measured by ELISA. The normal range of IgG AAB was specified as up to 10 µg/mL. In order to compare the central parameters of the groups, the following parametric and non-parametric methods were used: Student's t-test or Mann-Whitney U test. The level of significance for inter-group comparisons was set at $p<0.05$. Results: The mean levels of AAB to the S-100B protein were significantly higher ($p=0.0045$) in children with DM (16.84±1.54 µg/mL) when compared with "apparently healthy children" (2.09±0.05 µg/mL). The detected elevated levels of AAB to NMDA receptors may indicate that in children with type 1 DM, there is a change in the activity of the glutamatergic system, which in its turn suggests the presence of excitotoxicity. The mean levels of AAB to dopamine receptors were higher ($p=0.0082$) in patients comprising the study group than in the children of the comparison group (40.47±2.31 µg/mL and 3.91±0.09 µg/mL). The detected elevated levels of AAB to dopamine receptors suggest an altered activity of the dopaminergic system in children with DM. This can also be viewed as indirect evidence of altered activity of the brain's glutamatergic system. The mean levels of AAB to NMDA receptors were higher in patients with type 1 DM compared with the "apparently healthy children," at 13.16±2.07 µg/mL and 1.304±0.05 µg/mL, respectively ($p=0.0021$). The elevated mean levels of AAB to the S-100B protein may indicate damage to brain tissue in children with type 1 DM. A difference was also detected between the mean values of the measured AABs, and this difference depended on the duration of the disease: mean AAB values were significantly higher in patients whose disease had lasted more than five years. Conclusions: The elevated mean levels of AAB to the S-100B protein may indicate damage to brain tissue in the setting of excitotoxicity in children with type 1 DM. The discovered elevation of the levels of AAB to NMDA and dopamine receptors may indicate the activation of the glutamatergic and dopaminergic systems. The observed abnormalities indicate the presence of central nervous system damage in children with type 1 DM, with a tendency towards the elevation of the levels of the studied AABs with disease progression.

Keywords : autoantibodies, brain damage, children, diabetes mellitus
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