

## **Abstract**

**Aim.** The aim of the present work is to examine and compare brain abnormalities found on magnetic resonance imaging (MRI) in children diagnosed with autism spectrum disorders (ASD) and in children without this diagnosis. In terms of psychopathology, the aim is to evaluate a possible relationship between the MRI findings and the severity of autistic symptomatology.

**Methods.** The research study is based on a retrospective analysis of a sample of patients who attended a diagnostic examination focused on ASD and at the same time underwent brain MRI at the Department of Child Psychiatry of the Second Faculty of Medicine at Charles University and University Hospital Motol between the years 1998 and 2015. For clinical diagnosis of ASD, the International Classification of Diseases, 10th revision (ICD-10), was used. Between 1998 and 1999, the assessment of patients was supported by the Childhood Autism Rating Scale. Starting in 2000, the third version of the Autism Diagnostic Interview – Revised was used for assessments; and from 2012 onwards, the Autism Diagnostic Observation Schedule – Generic was added to the diagnostic procedures. From 1998 to 2015, a total of 489 children were diagnosed with pervasive developmental disorder (404 boys, 85 girls). The mean age in the group was  $8.0 \pm 4.2$  years (range 1.7–26.0 years). The control group consisted of patients in whom an ASD diagnosis was ruled out and included 45 children (36 boys, 9 girls; mean age  $7.0 \pm 2.4$  years, range 3.1–12.7 years).

**Results.** Brain abnormalities on MRI were more common in autistic children (45.4 %) compared with the control group (31.8 %), but the difference was significant only at trend level ( $p = 0.085$ ). Corpus callosum hypoplasia was significantly more common in the autistic group compared with the control group (13.7 % vs. 0 %;  $p = 0.009$ ). On the other hand, nonmyelinated areas of white matter were significantly more common in controls (31.8 % vs. 17.3 %;  $p = 0.018$ ). Differences in other parameters were not significant. The group of autistic children did not manifest a statistically significant correlation between the parameters examined on MRI and autistic psychopathology. A correlation between the category of other cysts and repetitive behavior was significant only at trend

level ( $p = 0.054$ ). Gliosis of the brain was significantly more frequent in autistic children with mental retardation than in children without mental retardation (14.1 % vs. 7.4 %;  $p = 0.028$ ). Nonmyelinated areas in the brain were significantly more frequent in autistic children with autistic regression than in children without autistic regression (29.9 % vs. 15.7 %;  $p = 0.008$ ). Mental retardation was significantly more frequent in autistic children with autistic regression than in children without regression (73.2 % vs. 52.5 %;  $p = 0.002$ ).

**Conclusion.** The study did not reveal a statistically significant correlation of brain abnormalities on MRI with autistic psychopathology. Despite this, corpus callosum hypoplasia found on routine MRI could be a possible biomarker in suspected ASD.

### **Keywords**

Autism spectrum disorders, MRI, Brain, Corpus callosum, Psychopathology