Comparing brain-derived neurotrophic factor levels, intelligence, and memory in clinical subtypes of attention-deficit hyperactivity disorder

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Abstract

Objectives: Attention-deficit hyperactivity disorder (ADHD) has been identified as a prevalent psychiatric condition (5% worldwide). Brain-derived neurotrophic factor (BDNF), a neurotrophin that modulates different aspects of neuronal function, was earlier demonstrated to play a key role in the survival and differentiation of midbrain dopaminergic neurons, and hence it may play a role in the pathogenesis of ADHD.

Patients and methods: The study included 29 new ADHD cases (drug naive) and 30 healthy controls. All children were subjected to history taking, physical examination, mental status examination, and IQ testing using the Arabic version of the Revised Wechsler Intelligence Scale for Children. The severity of symptoms in cases of ADHD was assessed using Conners’ Parent Rating Scale. Finally, blood sample was drawn for quantitative determination of plasma BDNF concentrations using human BDNF immunoassay kits.

Results: Children with ADHD had lower IQ results and higher BDNF. The mean±SD plasma BDNF level was significantly higher in ADHD cases than in controls (3138.5±2640.7 and 5476.9±5443, respectively). BDNF values showed numerical difference in subtypes of ADHD, being highest among cases having ADHD inattentive type, lower among those having ADHD combined type, and lowest among cases having ADHD hyperactive impulsive type. Correlation study revealed a moderate positive correlation with anxious/shy scores and a moderate negative correlation with hyperactive/impulsive scores. Multiple linear regression showed that the ADHD type was a significant predictor of plasma BDNF level ($\beta=0.445$, $P=0.021$), whereas sex and weight for age percentile were nonsignificant predictors ($P=0.227$ and 0.242, respectively).

Conclusion: Plasma BDNF is higher in ADHD patients than in normal controls. Its levels could be positively correlated to anxious/shy, psychosomatic, sociocognitive impairment, and inattentive scores, and negatively correlated with hyperactive/impulsive, perfectionism, emotional liability, and oppositional scores.