Serum copper and ceruloplasmin levels in children and adolescents with attention deficit hyperactivity disorder

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Klinik Psikofarmakoloji Bülteni
Bulletin of Clinical Psychopharmacology 2014; 24(2): 139-45
doi: 10.5455/bcp.20130614050435
http://www.scopemed.org/?mno=30493

Objective: Attention deficit hyperactivity disorder (ADHD) is the most common neuropsychiatric disorder seen in childhood. It is characterized by inattention, hyperactivity, and impulsivity that is inappropriate for the age and developmental level of the child. Although the number of studies investigating the neurobiological basis of ADHD is increasing, there is still no clear understanding of the mechanisms of the disorder. Serum copper and ceruloplasmin levels may play a role in the neurobiology of ADHD due to their effects on oxidative mechanisms and the dopaminergic-catecholaminergic system. However, the results of studies investigating the serum levels of copper in patients with ADHD are contradictory. Moreover, serum ceruloplasmin levels have not yet been studied. The aim of the current study was to compare the serum copper and ceruloplasmin levels in children and adolescents with ADHD to the levels found in healthy controls.

Method: This study included 43 children and adolescents (32 males, 11 females) with ADHD, who did not have any neurological, systemic, or comorbid psychiatric disorders, except for oppositional defiant disorder (ODD), and 32 gender and age-matched healthy controls (23 males, 9 females). Levels of serum copper and ceruloplasmin were compared between the two groups. Approximately 47% of the children with ADHD had comorbid ODD. The level of serum copper was measured using atomic absorption spectrophotometry, and serum ceruloplasmin was measured using nephelometry.

Results: The mean level of serum copper was 17.3±3.2 µg/dL in the ADHD group, and 16.9±2.6 in the control group. This difference was not significant (p=0.538). The mean serum ceruloplasmin level was 37.6 ± 6.9 µg/dL in the group with ADHD, and 36.9±6.4 µg/dL in the control group; this difference between groups was not significant (p=0.685). Moreover, no significant difference was observed between the groups with ADHD with or without ODD comorbidities and the control group for either levels of serum copper (p=0.845), or ceruloplasmin (p=0.878).

Conclusion: This study showed that serum copper and ceruloplasmin levels do not differ between children and adolescents with ADHD compared with controls. Although our results suggest that serum ceruloplasmin and copper do not have a direct role in the neurobiology of ADHD, there is a need for future studies with larger patient groups.