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The modulation of Plasma Levels of Dopamine, Serotonin, and Brain-derived neurotrophic factor in response to variation in iron availability

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Abstract: Background and aim: In the context of iron deficiency anemia, central dopamine, serotonin, and brain-derived neurotrophic factor (BDNF) are intensively investigated. However, peripheral isoforms are poorly investigated. This study aimed to investigate the modulation of plasma levels of dopamine, serotonin, and BDNF among children with iron deficiency anemia. Methods: A total of seventy-three iron-deficient (n=38) and iron-sufficient (n=35) children were included in the study. Twenty-nine subjects were showing clinical presentations and were diagnosed with iron deficiency anemia and forty-four were asymptomatic normal children. Plasma levels of dopamine, serotonin, and brain-derived neurotrophic factor were determined by enzyme-linked immunosorbent assay. Results: As compared to corresponding levels among control subjects, Anemic subjects were having significantly higher plasma dopamine and lower plasma brain-derived neurotrophic factor levels. A significant linear and monotonic association of plasma dopamine and brain-derived neurotrophic factor with hemoglobin concentration ($r=-0.520$, $P < 0.001$ and $r = 0.411$, $P = 0.001$), respectively. Furthermore, there were significantly higher plasma serotonin levels among iron-deficient subjects with a significant inverse linear association with serum ferritin levels ($r = -0.337$, $P = 0.005$). Conclusions: Iron deficiency anemia is associated with the modulation of peripheral dopamine, serotonin, and brain-derived neurotrophic factor. Upregulation of dopamine and downregulation of brain-derived neurotrophic factor are correlated to the anemic status. The upregulation of plasma serotonin levels is iron-dependent and, probably, is attributed to the impairment of its metabolic fate. Further investigation is required to explore the pathophysiological and clinical association of these peripheral biomolecules in the context of iron deficiency anemia