

## Abstract

ILAVSKÁ, Lucia. *Analysis of urinary metabolites in depressive disorders of children and adolescent* [Thesis]. Comenius University in Bratislava. Faculty of Mathematics, Physics and Informatics; Department of Nuclear Physics and Biophysics. Supervisor: prof. RNDr. Libusa Sikurova, CSc. Bratislava: FMFI UK, 2024. 135 p.

Depressive disorder is a serious mental disorder. It is increasingly diagnosed in childhood and adolescence. In addition to genetic factors, immunological-inflammatory factors, oxidative stress, disturbances in the metabolism of neurotransmitters, and tryptophan metabolism (precursor of serotonin) may play a role in the pathophysiology of depression. The exact mechanisms, especially in depressed children and adolescents, are not fully understood. The aim of the study was to investigate the role of metabolites of tryptophan degradation, neopterin, and biopterin in the pathophysiology of depressive disorder and the role of fatty acid supplementation in children and adolescents with depressive disorder. We also examined the relationship between the observed metabolites and the severity of depression, markers of oxidative stress, inflammatory response, and other factors. The observed metabolites in urine were analyzed by high-performance liquid chromatography with absorbance and fluorescence detection. We found lower levels of TRP, 5-HTP, SER and 5-HIAA; lower 5-HTP/TRP ratio; a higher KYN/TRP and 5-HIAA/SER ratio; unchanged levels of KYN, NEO and BIO in patients with depressive disorder compared to healthy controls. Supplementation with  $\omega$ -3 fatty acids increased the level of KYN, KYN/TRP, 5-HTP, and BIO, while  $\omega$ -6 fatty acids decreased TRP levels and increased the KYN/TRP ratio in the urine of child and adolescent patients with depressive disorder. The level of BIO was significantly increased 4 weeks after supplementation with  $\omega$ -3 fatty acids compared to the level at the beginning of the study. SER positively correlated with lipoperoxidation and a marker of oxidative protein damage. 5-HIAA negatively correlated with brain-derived neurotrophic factor and glutathione peroxidase, positively correlated with cholesterol and cortisol. The KYN/TRP ratio positively correlated with cortisol and the  $\omega - 6/\omega - 3$  ratio. Only 5-HIAA positively correlated with the severity of depression. The study provided new insights into the role of tryptophan metabolism in the pathophysiology of depressive disorder in children and adolescents.

**Key words:** depressive disorder, tryptophan metabolism, urine, HPLC, children and adolescents