STRESZCZENIE W JĘZYKU ANGIELSKIM/ SUMMARY

Key words: iron, iron overload, ferritin, hepcidin, leukemia, hemopoietic cell transplantation, children

INTRODUCTION

Modern therapies in pediatric oncology result in increasing effectiveness of treatment of children with acute leukemia (AL) or undergoing hematopoietic cell transplantation (HCT). Patients experiencing myelosuppression are in need of multiple transfusions of red blood cells. That leads to iron overload and its long-term complications. Data describing disorders in iron metabolism of children treated for AL or undergoing HCT is scarce. Discovery of hepcidin, a new iron regulatory protein may open up diagnostic and therapeutic possibilities.

RESULTS

The results of the study were published in a series of four publications. The aim of the study was to analyze disorders in iron metabolism of children treated for acute leukemias and undergoing hematopoietic cell transplantation.

The article **Impact of ferritin serum concentration on survival in children with acute leukemia: a long-term follow up** describes the results of a retrospective study that included 71 children treated for acute leukemia (ALL, AML) between 2005 and 2011. The number of RBC transfusions and serum ferritin concentration, serum transaminases activity, lactic dehydrogenase and C-reactive protein levels (CRP) were analyzed. The aim of the study was to evaluate the prognostic value of serum ferritin on long-term outcomes. Iron overload was observed in 52.1% of patients. Children treated for AML have had higher ferritin level compared to ALL. There was a correlation between ferritin concentration and alanine aminotransferase activity and CRP concentration. Both in the group of patients after HCT and without transplantation, there were differences in long-term outcomes with respect to high ferritin concentrations. Analysis of the results showed that serum ferritin concentration >1000 µg/L is an adverse prognostic marker of survival in children with acute leukemia treated with chemotherapy without/ with HCT.

In a paper entitled **Unbalance in iron metabolism in childhood leukemia converges with treatment intensity: biochemical and clinical analysis** results of prospective study conducted in 2019-2020 are presented. 85 children were qualified for the study, three groups were distinguished: de novo acute leukemia, after completion of intensive treatment for acute leukemia and after hematopoietic cell transplantation and a control group (n=18). 14 parameters of iron metabolism were analyzed, including ferritin, hepcidin, hemojuvelin, NTBI, LPI and others. Iron metabolism disorders were demonstrated in the studied group of pediatric patients. The presence of toxic iron fractions was detected in the studied patient

groups. It has been shown that disturbances in iron metabolism increase with the intensity of treatment.

The article **Soluble hemojuvelin and ferritin: potential prognostic markers in pediatric hematopoietic cell transplantation** describes the results of a prospective study conducted on a group of 137 pediatric patients. The study group included children treated for AL or undergoing HCT. The occurrence of disorders in iron metabolism in children with AL or after HCT and their dependence on the intensity of oncological treatment were confirmed. It has been shown that increased ferritin levels and decreased hemojuvelin levels are negative prognostic factors for survival in children after HCT.

The purpose of systematic review **Hepcidin in children and adults with acute leukemia or undergoing hematopoietic cell transplantation** was to summarize the observational studies on hepcidin in patients treated for acute leukemia or undergoing hematopoietic cell transplantation. From 3687 publications, 13 papers were identified in accordance with the inclusion criteria. Only 4 studies focused on children. Higher hepcidin concentrations have been described in the group of patients with acute leukemia or after HCT compared to control groups, as well as variability of hepcidin levels depending on the stage of oncological treatment. Additionally, the analysis revealed a lack of standardization of methods in laboratory determinations of hepcidin.

CONCLUSIONS

Each of the presented studies complements the scarce data on iron metabolism disorders in children treated for acute leukemia or undergoing hematopoietic cell transplantation. The results of this study clearly show that the consequence of numerous RBC transfusions is the overload of the body with iron in the studied group of pediatric patients. The intensity of oncological treatment affects disorders in iron metabolism. The assessment of ferritin and hepcidin levels reflects the state of iron overload. Regardless of the presented conclusions, the potential use of parameters such as hepcidin, NTBI or LPI in clinical work requires further research on a larger group of patients.