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ELEVENTH ANNUAL MEETING

IRON STATUS AND OVERLOAD IN CHILDREN WITH ACUTE LYMPHOBLASTIC LEUKEMIA (ALL) DURING DIFFERENT PHASES OF THERAPY IN A PEDIATRIC ONCOLOGY CENTER IN EGYPT

M Elalfy[1], S Ramadan[1] , S Kamel[2], K Eltonbary[1]

1. Department of Pediatrics, Ain Shams University, Cairo, Egypt.
2. Department of Diagnostic and Interventional Radiology, Ain Shams University, Cairo, Egypt.

INTRODUCTION

Children with ALL may develop iron overload, primarily due to repeated transfusions. Excess iron exerts toxic effects through oxygen free radicals, which may increase the risk of infectious complications and proliferation of malignant cells(1).

AIM

To assess iron status and iron overload in pediatric ALL patients at different phases of treatment.

METHOD

A cross-sectional study was performed in children with ALL (aged >1-16 years) being followed in the Pediatric Oncology Unit, Children's Hospital, Ain Shams University, from March 2022 to September 2022.

Almost one-third of the patients were receiving induction or consolidation, one-third continuation therapy, and one-third were survivors. The patients' transfusion histories, clinical data and risk stratification were recorded. Iron profiles were assessed. R2* magnetic resonance imaging (R2*-MRI) was performed to measure liver iron content (LIC) in a limited group (≥8 years, with either SF >1000 ng/mL, >6 packed red blood cell [PRBC] transfusions or total transfusion volume ≥100 mL/kg).

RESULTS

The study included 70 ALL patients (Pre-B, 78.8% and T cell, 21.2%). Almost 33% received ≥6 PRBC transfusions. SF was elevated in 60% of patients but there were no significant differences in SF in relation to different age groups or sex. SF was significantly elevated in patients with T-cell ALL and it was significantly higher in patients during induction and consolidation phases, whereas serum iron and transferrin saturation were significantly higher in patients during the maintenance phase, but no correlation was found with the number of PRBC transfusions. Almost 60% (10 out of 16 ALL) of those who had the R2*-MRI assessment had mild-moderate iron load (LIC range 1.36-8.96 mg/g, median 2.31 (IQ 1.85-5.0).

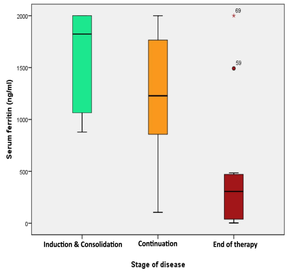


Figure 1: Box and Plot chart for stage of disease and serum ferritin

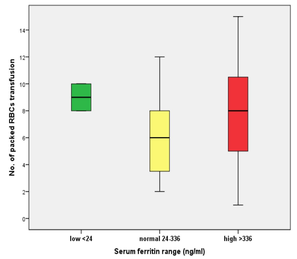


Figure 2: Box & plot chart for relation between Serum ferritin range and No. of packed RBCs transfusion

Table 1: Clinical data of the studied patients

Variables	No.	%
Age (years)		
Mean ± SD	8.9 ± 4.04	
Min. – Max.	1.5 – 16.0	
Median (IQR)	8.0 (6.0 – 12.0)	
Sex		
Male	44	62.9
Female	26	37.1
Weight (Kg)		
Mean ± SD	30.4 ± 14.69	
Min. – Max.	8.5 – 65.0	
Median (IQR)	27.0 (20.0 – 40.5)	
Height (cm.)		
Mean ± SD	126.3 ± 22.36	
Min. – Max.	80.0 – 165.0	
Median (IQR)	121.0 (110.0 – 143.5)	
BMI percentiles		
Mean ± SD	51.0 ± 31.99	
Min. – Max.	1.1 – 95.7	
Median (IQR)	60.05 (17.425 – 74.875)	
Diagnosis		
ALL T cells	11	15.7
ALL pre B cells	48	68.6
Risk stratification		
LR	18	25.7
SR	44	62.9
HR	8	11.4
Stage of chemotherapy		
Induction & Consolidation	8	11.4
Continuation	50	71.4
End of therapy	12	17.1

CONCLUSIONS

Children with ALL, mainly the T-cell subset, developed significant iron overload and SF was also significantly elevated during induction and consolidation phases. PRBC transfusion is an important risk factor for iron overload, being correlated with mild-moderate hepatic iron overload. The significance of altered iron homeostasis during leukemia management needs to be further elucidated.

REFERENCES

1- Das S, Misra A, Kashyap A, Meena S, Singh A, Aggarwal KC. Study of transfusion-related iron overload (trio) in pediatric patients with hematological malignancy and bone marrow failure syndromes. Am J Blood Res. 2021 Aug 15;11(4):384-390. PMID: 34540346; PMCID: PMC8446827.

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CONTACT INFORMATION

Dr. Khadiga Eltonbary

email: khadigadoc@yahoo.com.