

Close Relation between Anemia Parameters and C-reactive Protein Verified in a Large Paediatric Cohort

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Introduction. Disease-related anemia in children, though of common knowledge, is poorly described; only sporadic historical data, studies on small hospital cohorts or in general population are available in literature. Mechanisms and dynamics of damage in red cell production in patients with infections and inflammation are not clear. There is a critical need to better understand inflammation-associated anemia; however, because unexplained early anemia is associated with poor prognosis in children presenting with severe viral or bacterial infections.

Aim, Materials and Methods. The aim of the study is to correlate blood red cells indices (HGB, RBC, MCV, MCHC) with CRP in paediatric patients to analyze relations between anemia and inflammation. 70,024 parallel blood tests (Advia 2120i, Siemens) and turbidimetric CRP test (Cobas 60000, Roche) performed at Riga Children's Clinical University Hospital Laboratory in 2011–2013 were retrospectively analyzed. Results from Emergency, Neonatology, Intensive Care, Hematooncology, Infections and Outpatient departments were further analyzed. Statistics were performed by Microsoft Excel (data grouping) and IBM SPSS Statistics program (Spearman for correlations and Mann-Whitney for differences).

Results. 27.8% samples were anemic after age and gender adjustment, 11.7% of them were possibly iron-deficient (MCHC low, MCV low/normal); only 0.3% had high MCV and MCHC. HGB, RBC and MCV significantly correlated with CRP in the total cohort ($p < 0.0001$). HGB was significantly lower in patients with CRP > 5 –50 mg/L than in patients with normal CRP in all groups but Neonatology; and significantly lower in patients with CRP > 50 mg/L than in patients with CRP > 5 –50 mg/L in all groups. CRP was significantly elevated in patients with anemia (after age and gender adjustment, $p < 0.0001$ in the total cohort and all groups).

Conclusions. The study was performed on a much broader basis than previous reports. Results support observations of frequent anemia in paediatric hospital setting, mostly not iron deficient. HGB/RBC and CRP were highly significantly related in the whole cohort and in specific patient profiles, indicating a close biological relationship between anemia and inflammation. Use of bulk data approach provided additional possibilities for analysis.