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Characteristics of anemia and iron status and their associations with blood manganese and lead among children aged from 3 to 19 years old from four First Nation communities in Quebec

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Iron deficiency (ID) and anemia are prevalent in indigenous communities. Iron is a divalent metal that may interact with manganese (Mn), lead (Pb), cobalt (Co), zinc (Zn) and cadmium (Ca). All share common absorptive pathways and iron deficiency (ID) is known to up-regulate other metals, thereby increasing their intestinal absorption, concentration inside the body. This study aimed at investigating the prevalence, types, and severity of childhood anemia and ID and also to study and document the possible associations between blood Mn, Pb, Cd, Zn, Co and iron biomarkers are the objects of this study. Blood samples for hemoglobin (Hb), iron biomarkers, blood Mn, Cd, Zn, Co and Pb were collected from 4 First Nations of Quebec. Descriptive and multiple regression statistical analysis adjusting for relevant co-variables are used to assess research objectives. Results showed ID and anemia prevalence of 20.7% and 17.6% respectively, among which 8.8% present iron deficiency anemia. Moreover, up to 11.5% (n=22) present elevated blood Mn (median=15.9 µg/L) of which 25.6% are having ID. Multiple regression analysis for Mn showed that blood Mn and Co were negatively associated with log ferritin concentrations ($\beta=-2.4$; $p<0.0001$), (-0.015; $P<0.0001$) respectively, whereas log Cd showed positive association with Hb and log Co was negatively associated with Hb levels. Blood lead levels were low (median=5.4 µg/L). The prevalence of ID, anemia and elevated blood Mn was very high in these children. Conversely, low Pb exposure was observed. Improving iron status, would decrease anemia and restore normal Mn blood levels.

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