Evaluation of iron status of children in the presence of infection: effects of iron supplementation on iron status, infection and morbidity

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Abstract:

Four hundred and fifty three children aged between 5-10 years were recruited from the out patients department, Lady Ridgeway Hospital, Colombo, Sri Lanka for this randomized, controlled, double blind iron supplementation study. Children with a past history of recurrent upper respiratory infections (URTI) and laboratory and clinical evidence of a current infection were the infection group, while controls (without infection) were children without laboratory or clinical evidence of infection and no past history of recurrent URTI. The nutritional, haematological, iron and morbidity status were assessed in both groups at baseline by measuring anthropometric and inflammatory indicators. Haemoglobin, serum ferritin, serum transferring receptor (sTFR) and potential cnfounders; folic acid and vitamin B12 were also assessed. The children were randomly assigned to once daily FeSO4 (60mg iron) or placebo (0.5 g lactose supplementation for 8 weeks. Morbidity from URTI and gastro intestinal infections and compliance to intervention for the preceding fortnight was recorded by trained field staff using interviewer-administered questionnaires. Dietary intake was recorded using multiple 24 hour recalls. At post-intervention, subjects were reassessed and baseline measurements were repeated. The study subjects were from a similar, socio economically deprived backgrounds. The nutritional status of study subjects was poor but none were severely malnourished. A high prevalence of anaemia existed among the children with 52.6 percent having Hb<115g/L. There was no significant differences in haemoglobin concentrations between children with or without infection. When iron status was assessed using an elevated cut off for serum ferritin (<50 µg/L) to detect iron deficiency in the presence of infection, children with infection (52.9 percent) had a significantly higher (P<0.001) prevalence of iron deficiency than the uninfected group (40.3 percent) when a cut off 25µwas used. Low folate status (serum folate <3ng/ml) was seen in 22.2 percent of subjects, whereas vitamin B12 deficiency (serum vitamin B12<150 pg/ml) was noted in 0.65 percent. Combined deficiencies of iron and folate were noted in 8.7 percent of children. All subjects had low intakes of energy and iron and intakes did not change significantly during the study period. A high compliance was noted in all study subjects given iron (95.5 percent or placebo (97 percent). The prevalence of anaemia and iron deficiency decreased significantly in iron supplemented children in infection and without infection groups, with

significant increases in Hb and serum ferritin concentrations when compared with placebo groups. Iron supplementation also caused a significant reduction in morbidity from URTI in children with, or without infection when compared with placebo groups. Children with infection given iron had a reduction in mean number of episodes ($P<0.001$), severity of infection ($P<0.05$) and duration of illness ($P<0.001$) when compared with placebo. An improvement was also seen in the school attendance of children with infection following iron supplementation. A significant reduction in morbidity was noted in children without infection even though the episodes and duration of infections were low. Further, iron supplementation did not cause an increase in morbidity in iron replete children when compared with iron deficient children. This study indicates that children with recurrent upper respiratory infections may benefit from iron supplementation even during episodes of infections in terms of reduced morbidity and improved iron status.

Key Words : Controlled Clinical Trials / Anemia, Iron-Deficiency-epidemiology / Anemia, Iron-Deficiency-complications / Anemia, Iron-Deficiency-drug therapy / Respiratory Tract Infections-complications / Respiratory Tract Infections-epidemiology / Child / Ferritins-blood / Double-Blind Method / Ferrous Compounds