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Microencapsulated ferrous fumarate sprinkles in the treatment of iron deficiency anemia in infants and young children in Bolivia

Introduction: Iron deficiency is the most common micronutrient deficiency in developing countries, and iron deficiency anemia a leading cause of morbidity and mortality among children worldwide, yet adherence to the standard ferrous sulfate syrup has been poor and often unsuccessful. Microencapsulated ferrous fumarate was developed to be sprinkled directly onto any semisolid food, without changing its colour, texture or taste. Studies have shown that **Sprinkles** are as efficacious as the standard drops, and are also associated with improved ease of use and convenience. Hospital Cuschieri and the Society for the Human Family in Christ provide medical care and outreach programs to families of the altilano communities of Cochabamba.

Objective: To screen a pediatric population at risk for iron deficiency anemia and to treat all anemic individuals with ferrous fumarate Sprinkles™.

Methods: Children (age range 1-6 years) in Colcapirrhua, Bolivia were screened for anemia using a commercially-available, capillary blood hemoglobin photometer. Children found anemic (Hb < 12.4 g/dL) entered a clinical trial to receive a daily sachet of microencapsulated ferrous fumarate (40 mg elemental iron and 50 mg ascorbic acid) to be sprinkled onto any complimentary meal they consumed. They were also given one dose of pyrantel pamoate, an anti-helminthic to treat for parasites endemic to this population. The main outcome measure was a change in hemoglobin.

Results: 302 children were screened in local classrooms and among women's and children's health groups. 104 (34%) were found to be anemic, and were sent for confirmatory testing to diagnose iron deficiency. 74 completed studies for serum iron and transferrin (reflective of transferrin saturation). 71 (96%) had transferrin levels suggestive of iron deficiency. For the cohort that entered the clinical trial and were retested at 2 months for hemoglobin (N=62), average initial hemoglobin was 11.3 ± 1.0 g/dL. At two months, their average hemoglobin was 13.5 ± 1.0 g/dL which was significantly different from baseline ($p < 0.0005$). The mean change in hemoglobin was 2.2g/dL (95% confidence interval = 1.9, 2.5).

Conclusion: The prevalence of anemia among children screened in this rural/suburban region of Bolivia was 35%. In the treated cohort Ferrous fumarate Sprinkles™ significantly increased hemoglobin levels. The final prevalence was only 9%, with a corresponding cure rate of 91%. Ferrous fumarate Sprinkles™ significantly increased hemoglobin levels. The data collected in this study, supported by evidence from randomized controlled trials on Sprinkles, will aid in the development of outreach programs for the identification and treatment of iron deficiency anemia, and in the prevention of morbidity associated with iron deficiency in childhood.