Exogenous Phytase Added to Lipid Based Nutrient Supplements Increases Fractional and Total Absorption of Zinc Among Young Gambian Children: A Randomized Controlled Trial (OR07-01-19)

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Objectives: Dietary phytate inhibits zinc absorption from composite meals in adults. The objective of this study was to investigate the efficacy of adding exogenous phytase to a small-quantity lipid based nutrient supplement (SQ-LNS) on zinc absorption among young children.

Methods: In a double-blind randomized controlled trial, intra-individual differences in fractional and total absorption of zinc (FAZ and TAZ, respectively) from SQ-LNS with and without phytase were measured in 30 asymptomatic 18–23 month old children in the Kiang West district of The Gambia. Using a cross-over design, children received for one day each test meals of a millet-based porridge with 20 g SQ-LNS containing 8 mg zinc and either: 1) exogenous phytase (~500 phytase units (FTU)) or 2) no exogenous phytase. The test meals were provided on consecutive days in randomized order. FAZ was measured using a dual-stable isotope tracer ratio technique with ^{67} Zn and ^{70} Zn as oral tracers, randomized independently of SQ-LNS product, and ^{68} Zn as the intravenous tracer. TAZ was calculated as the product of total dietary zinc (TDZ) intake from test meals (i.e., porridge, SQ-LNS and stable isotope) and FAZ. FAZ and TAZ were compared for meals with and without phytase using mixed-models ANOVA with product, study day, and oral isotope allocation as fixed effects and individual child as a random effect.

Results: Twenty-six participants completed the study. The prevalence of stunting, underweight and wasting were 20%, 30% and 13%, respectively; no children had low plasma zinc concentrations (< 65 μg/dL). TDZ and phytate intakes from the test meals were 7.2 $\pm$ 2.2 mg and 182.9 $\pm$ 64.7 mg, respectively (phytate: zinc molar ratio $= 2.4 \pm 0.2$). Mean FAZ increased from 8.6 $\pm$ 1.3% to 16.0 $\pm$ 1.3% when exogenous phytase was added to the SQ-LNS product ($P = 0.0002$). Mean TAZ from porridge test meals containing SQ-LNS with phytase was more than double that from test meals containing SQ-LNS without phytase (1.12 $\pm$ 0.07 mg and 0.52 $\pm$ 0.07 mg, respectively; $P < 0.0001$).

Conclusions: The addition of exogenous phytase to a meal of millet-based porridge with SQ-LNS improved both FAZ and TAZ. These results suggest that phytate reduction may be an important strategy to improve zinc absorption among young children.

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