Efficacy of multiple-micronutrient fortified biscuits on micronutrient status and cognitive performance of adolescent girls in Ghana: A randomized control trial

Fusta Azupogo1, 2*, Abdul-Razak Abizari4, Inge D. Brouwer1

1Division of Human Nutrition and Health, Wageningen University and Research, Wageningen, The Netherlands; 2Department of Family and Consumer Sciences, Faculty of Agriculture, Food & Consumer Sciences, University for Development Studies, Box TL 1882, Tamale, Ghana; 4Posthumously

Introduction

❖ Food fortification is potentially a useful strategy to optimize adolescent girls' nutrition, improve their health and work capacity, and break intergenerational cycles of malnutrition and deprivation.
❖ However, limited knowledge of the efficacy and timing (regarding menarche) of such interventions, especially in resource-poor settings, delays progress.

Objectives

To evaluate the effect of consuming multiple-micronutrient fortified biscuits (MMB) 5 days weekly compared to unfortified biscuits (UB) on micronutrient status, height, and cognitive performance of female adolescents (10-17 yrs.), and how the intervention effect relates to its timing before or after menarche

Methods

A 26-week double-blind, randomized placebo-controlled trial with base- and end-line measurement of: plasma biomarkers (primary outcomes), cognition and anthropometry (secondary outcomes)

❖ Analysis was intention-to-treat, followed by per-protocol and subgroup analysis for baseline anaemic girls.
❖ SAS Proc Mixed was used

Results

❖ We found no effect of the intervention on hematologic biomarkers and retinol binding protein.
❖ Body iron stores (calculated) decreased in the MMB group post-intervention( \(P < 0.05\)).
❖ No effect of intervention on iron and vitamin deficiencies.
❖ No effect on anthropometric indices and cognition.
❖ No effect modification of baseline menarche status observed.
❖ In a sub-group analysis for anaemic girls, post-intervention working memory and mathematic scores for girls in the MMB group increased significantly ( \(P<0.05\)).

Conclusion

In this group of rural Ghanaian adolescent girls, we found no evidence that MMB consumption improves micronutrient status, cognition, and anthropometric indices.