Vitamin Status and Supplementation of Rural Gambian Women

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Ongoing studies by the Dunn Nutrition Laboratory in a rural farming region of The Gambia in West Africa have included measurements of vitamin status and the effects of vitamin (and food) supplements in deficiency, especially on pregnant and lactating women and their infants.

Riboflavin (B<sub>2</sub>) deficiency (Fig. 1) is both common and severe. Clinical

**FIG. 1.** Riboflavin (vitamin B<sub>2</sub>) supplementation of lactating Gambian women: (ordinate) daily riboflavin intake (mg) before and after supplementation; (abscissa) (●) activation coefficient of EGRAC; (○) breast milk riboflavin (μg/ml). Means with 1 SD for each value, each from 30 to 150 measurements.
FIG. 2. Vitamin C supplementation of lactating Gambian women: (ordinate) daily vitamin C intake (mg) before and after supplementation; (abscissa) (●) plasma vitamin C (mg/dl); (○) breast milk vitamin C (μg/dl). Means with 1 SD for each value; 16 (or more) measurements contributing to each value.

FIG. 3. Vitamin A supplementation of lactating Gambian women: (ordinate) daily intake of retinol equivalents (μg), assuming 6 units by weight of β-carotene yield 1 unit of retinol; (abscissa) (●) plasma retinol (μg/dl); (○) breast milk retinol (μg/dl). Mean values obtained from 18 to 37 subjects from two villages.
signs (mouth lesions) were corrected by a 1 mg daily riboflavin supplement in food, added to the circa 0.5-mg daily intake from local home foods. For complete correction of biochemical status, based on the activation coefficient of erythrocyte glutathione reductase (EGRAC), a 2-mg daily supplement was needed. Breast milk riboflavin was moderately increased by these supplements.

Biochemical vitamin C deficiency (Fig. 2) arises during the rainy season and is accompanied by very low breast milk vitamin C levels. Blood and breast milk indices of vitamin C status improved during vitamin C supplementation and achieved "acceptable" levels at a supplement level of 100 mg/day.

Intakes of vitamin A and its precursors from local foods fall far below the current recommended dietary intakes (RDI) (assuming a \( \beta \)-carotene:retinol conversion ratio of 1:6); however, very little evidence of any maternal deficiency was obtained, based either on plasma retinol levels or on dark-adaptation indices (Fig. 3). It thus appears that Gambian women utilize their limited food carotenoid sources very efficiently to maintain their vitamin A status.