Abstract

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Zinc supplementation reduced DNA breaks in Ethiopian women.

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OBJECTIVE: Assessment of zinc status remains a challenge largely because serum/plasma zinc may not accurately reflect an individual's zinc status. The comet assay, a sensitive method capable of detecting intracellular DNA strand breaks, may serve as a functional biomarker of zinc status. We hypothesized that effects of zinc supplementation on intracellular DNA damage could be assessed from samples collected in field studies in Ethiopia using the comet assay.

METHODS: Forty women, from villages where reported consumption of meat was less than once per month and phytate levels were high, received 20 mg zinc as zinc sulfate or placebo daily for 17 days in a randomized placebo-controlled trial. Plasma zinc concentrations were determined by inductively coupled plasma mass spectrometry. Cells from whole blood at the baseline and end point of the study were embedded in agarose, electrophoresed, and stained before being scored by an investigator blinded to the treatments.

RESULTS: Although zinc supplementation did not significantly affect plasma zinc, mean (± SEM) comet tail moment measurement of supplemented women decreased from 39.7 ± 2.7 to 30.0 ± 1.8 ($P < .005$), indicating a decrease in DNA strand breaks in zinc-supplemented individuals.

CONCLUSION: These findings demonstrated that the comet assay could be used as a functional assay to assess the effects of zinc supplementation on DNA integrity in samples collected in a field setting where food sources of bioavailable zinc are limited. Furthermore, the comet assay was sufficiently sensitive to detect changes in zinc status as a result of supplementation despite no significant changes in plasma zinc.

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