Assessment of cassava fermentation to reduce the phytate content, and its implications for zinc, iron and calcium bioavailability

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Fermentation of cassava was evaluated for phytate reduction (mineral chelator), to improve zinc, iron and calcium bioavailability.

Cassava tubers were peeled, cleaned, grated and fermented during 15 days, after fermentation the slurry was dried and toasted. Before and after fermentation, minerals were analyzed by flame atomic absorption spectrophotometry and phytate by HPLC. Lactic acid and pH were analyzed during the whole process. The inhibitory effect of phytate on the bioavailability of minerals was determined by calculating the corresponding phytate:zinc, phytate:iron and phytate:calcium molar ratios.

Fermentation resulted in the reduction of phytate from 146 to 9.9 [mg/100g] (93\%↓). The percentages of retention for minerals were: 95.7\% for zinc (from 1.07 to 1.02 [mg/100g]), 73.3\% for iron (from 0.98 to 0.65 [mg/100g]) and 97.1\% for calcium (from 41.1 to 39.9 [mg/100g]). Lactic acid increased from 0.08 to 0.85 \% (90.6\%↑) and pH decreased from 6.78 to 3.68 (45.7\%↓). The reduction of molar ratios were: phytate:zinc from 13.5 to 0.92 (93\%↓), phytate:iron from 13.8 to 1.28 (91.1\%↓), phytate:calcium from 0.22 to 0.015 (93\%↓).

The suggested critical ratios that compromise bioavailability are phytate:zinc 15, phytate:iron 1, phytate:Calcium 0.24. The phytate:iron molar ratio before fermentation was higher than the suggested ratio, likely to markedly impair iron absorption. All molar ratios were lower after fermentation due to the phytate reduction. Fermentation leads to lowering of pH as a consequence of lactic acid production, which is favorable for native phytase activity for phytate degradation.

Results indicate that fermentation of cassava may improve zinc, iron and calcium bioavailability.