BACKGROUND

✓ Guatemala is a country with an extensive background on micronutrient deficiencies. Food fortification is one of many efforts developed to control these micronutrient deficiencies, i.e. vitamin A in sugar

✓ Beverages can be a suitable vehicle to supply populations with many micronutrients2,3

OBJECTIVE

To compare the evolution of biomarkers of nutritional status with respect to four vitamins (riboflavin, folate, vitamins B12 and D), across two rural samples (schoolchildren and women of fertile age), randomized to receive supervised consumption of a daily serving of a beverage.

METHODS

Subjects: A total of 166 women and 134 schoolchildren, of both sexes, aged 6 to 11 y from the Province of Retalhulu on the Pacific Coast of Guatemala.

Intervention: The distribution of the beverage was conducted over a period of 10-months at a household-level. All households were stratified and randomized. During the intervention, 350 mL bottles containing the fortified or non-fortified beverage were delivered to participants and family members (1 serving per day over 5 days per study week).

A total of 152 individuals – 79 women and 73 schoolchildren – were assigned to the intervention group (fortified beverage) and 130 subjects – 78 women and 61 schoolchildren – entered the control group (non-fortified beverage).

Blood collection: 291 blood samples were obtained at baseline and at end line moments of the intervention, to assess circulating levels of vitamins D (Osteoporosis Research Center at Creighton University in Omaha, Nebraska), B12 and B2 and folate (USDA / Tufts Human Nutrition Research Center on Aging in Boston, Massachusetts).

Data Analysis: IBM SPSS Version 20 was used to analyze data. Descriptive statistics were expressed as media, SD and median (Table). Paired t-Test, Student t-Test, Wilcoxon Test and Mann-Whitney U-Test were used to compare between groups (fortified and non-fortified).

RESULTS

Table. Descriptive Statistics: Baseline and endline moments by age and intervention

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Fortified Beverage</th>
<th>Non-Fortified Beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Endline</td>
</tr>
<tr>
<td>WOMEN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D</td>
<td>30.4±9.6</td>
<td>27.9±7.4</td>
</tr>
<tr>
<td>ng/mL</td>
<td>29.5</td>
<td>30.4</td>
</tr>
<tr>
<td>Folate</td>
<td>7.0±10.5</td>
<td>7.5±12.0</td>
</tr>
<tr>
<td>pmol/mL</td>
<td>7.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>3.7±5.6</td>
<td>13.4±11.0</td>
</tr>
<tr>
<td>ng/mL</td>
<td>4.7</td>
<td>13.4</td>
</tr>
<tr>
<td>Vitamin B2</td>
<td>17.1±10.5</td>
<td>29.3±17.2</td>
</tr>
<tr>
<td>pmol/mL</td>
<td>17.1</td>
<td>29.3</td>
</tr>
<tr>
<td>Folate</td>
<td>12.2±5.5</td>
<td>12.6±5.7</td>
</tr>
<tr>
<td>pmol/mL</td>
<td>12.2</td>
<td>12.6</td>
</tr>
</tbody>
</table>

SHORT-TERM EFFICACY OF A REFRESHING BEVERAGE, FORTIFIED WITH SELECTED MICRONUTRIENTS, TO IMPROVE THE MICRONUTRITION STATUS OF SCHOOLCHILDREN AND WOMEN IN THE CONTEXT OF THE NUTRITIONAL SITUATION IN RURAL GUATEMALA

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DISCUSSION/CONCLUSION

- Pre-existing deficits in nutritional status were found for all nutrients of interest in this low-income, rural coastal population in southern Guatemala.

- The only time-dependent changes (by repeated measures) in women were found in the folate status, and only in the fortification subsample.

- There were statistically-significant, time-dependent increases in all four biomarkers for schoolchildren in the fortified-subgroup.

- Important improvements in biomarker status (fortified > non-fortified at endline) were documented with respect to the fortification of vitamin B12 and riboflavin in both women and schoolchildren. In children, the fortified beverage produced improvement in vitamin D and folate as well.

- Thus, the apparent impact of a 10-month offering of a fortified beverage on nutritional biomarkers was much more evident in schoolchildren than in adult women.

- Moreover, significant differences were found on the inter-treatment comparison at end line status for the schoolchildren group.

ACKNOWLEDGEMENTS

This research was funded by cbc (Guatemala). DSM (Basel); Hildergard Grunow Foundation (Munich); Osteoporosis Research Center, Creighton University (USA) and Sight and Life (Basel).

REFERENCES


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