Whole grains and dry beans demonstrate compelling chronic disease fighting properties, yet consumption of these staple foods remain extremely low. A growing community-academic-partnership is conducting clinical trials for increased consumption in children to adults. Our main objectives are to: 1) establish feasibility of increasing navy bean powder (NBP) and rice bran (RB) intake in children with elevated cholesterol levels (NCT01929122) and adults with a history of colorectal cancer (NCT01929122); 2) examine changes in overall dietary intakes with the addition of RB and/or NBP, and 3) favorably modulate the blood and stool metabolome. Meals and snacks were developed for inclusion of NBP and/or RB in amounts that promote public health nutrition for chronic disease prevention, including cardiovascular disease and colorectal cancer.

Study food development

Why rice bran and beans?

Figure 1. Staple foods like rice bran and beans are rich in nutrients and fiber, which confer health benefits. A. Whole grain rice and rice bran. B. Navy bean powder and rice bran.

Healthy Hearts

Increasing rice bran and navy bean intake in children with hypercholesterolemia

Table 1. Nutrient composition of one study snack across groups. Recipes were analyzed using NutritiOnDiet® diet analysis software (Axxys Systems, Redmond, WA).

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Control</th>
<th>Navy Bean Powder</th>
<th>Rice Bran</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories (kcal)</td>
<td>240-260</td>
<td>253</td>
<td>256</td>
<td>259</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>36-42</td>
<td>37</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>3-4</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>2-3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>150-175</td>
<td>159</td>
<td>160</td>
<td>162</td>
</tr>
</tbody>
</table>

2) Examine dietary intakes and baseline and week 4-9% daily caloric intake with 80-100% intervention compliance. Dietary intake data at baseline conforms a western dietary pattern including low fiber, high sodium, and high fat intake. This dietary significantly increased total dietary fiber intakes at 4-weeks (p<0.05). Adding NBP or RB into prepared meals represents an economically feasible and feasible approach to achieve dietary intakes that may control or prevent chronic diseases. Our data suggest that NBP and RB are promising solutions that merit public health nutrition education and research attention.

BENEFIT

Beans/Bran Enriching Nutritional Eating For Intestinal health Trial

Table 2. Macronutrient changes for study intervention from baseline to week 4

<table>
<thead>
<tr>
<th>Nutrient</th>
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<td>159</td>
<td>160</td>
<td>162</td>
</tr>
</tbody>
</table>

Figure 2. A registered dietitian and certified chef developed seven meals and six snacks that included the addition of rice bran and/or navy bean powder.

Conclusion & Future Directions

These results suggest unique phytochemicals and nutrient profiles of rice bran and navy beans may modulate nutrient bioavailability and utilization. 1) Established feasibility of increased navy bean powder and/or rice bran intake in children with hypercholesterolemia and colorectal cancer survivors. 2) Examined dietary intakes and baseline and week 4-9% daily caloric intake with 80-100% intervention compliance. Dietary intake data at baseline conforms a western dietary pattern including low fiber, high sodium, and high fat intake. This dietary significantly increased total dietary fiber intakes at 4-weeks (p<0.05). Adding NBP or RB into prepared meals represents an economically feasible and feasible approach to achieve dietary intakes that may control or prevent chronic diseases. Our data suggest that NBP and RB are promising solutions that merit public health nutrition education and research attention.

Table 3. Participant characteristics of study population at baseline and week 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control</th>
<th>Navy Bean Powder</th>
<th>Rice Bran</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>8-13</td>
<td>8</td>
<td>9</td>
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<td>Weight (kg)</td>
<td>50-65</td>
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</tr>
<tr>
<td>Height (cm)</td>
<td>130-150</td>
<td>140</td>
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<tr>
<td>Baseline cholesterol (mg/dL)</td>
<td>150-200</td>
<td>180</td>
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<td>180</td>
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</tbody>
</table>

Acknowledgments

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References

Borresen, E et al. (2011) Dietary intervention with high-stabilized rice bran modulates stool metabolome and intestinal health in healthy, adults, females.