Assessment of Sources and Dietary Intake of Isoflavones in the U.S. Diet

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Abstract 729.4

Soy products are a major source of dietary isoflavones, with weak estrogenic, and other biological properties that may contribute to the reduction of the risk of some chronic diseases, such as cancer, i.e. prostate and melanoma. This presentation will examine sources of isoflavones in the diet for the U.S. population. Data for soy foods taken from the USDA database for the Isoflavone Content of Selected Foods, Releases 2.0 were combined with food composition data from the NCI, common measures of isoflavone content and the corresponding daily intakes weighted data, and grams per day. By multiplying total isoflavone content by the grams consumed, the daily intake of total isoflavones contributed by individual foods was determined. Soymilk was the leading contributor, followed by soy sauce, meatless products, and meats. Non-soy products, such as frankfurters and various baked products which contain soy ingredients, i.e. soy flour or soy isolates, provide isoflavones to the diet. Knowing the quantities of isoflavones consumed and their relative contributions to dietary intake will assist in a range of studies relating to various diseases.

Introduction

Isoflavones, a subclass of flavonoids, may contribute to the reduction of the risk of some chronic diseases. Takii et al. (2007) showed that soy isolates and soy protein products lower serum total and LDL cholesterol in humans. Although evidence for the beneficial role of soy isolates in breast cancer has been confirmed, results of clinical trials for prostate cancer are promising. Soymilk and traditional soy foods containing individual isoflavones (Tables 1-3) are similar. Soymilk, the largest contributor, comprised 22%-22%, 24% and 18% of the intake for total isoflavones, daidzein, genistein, and glycitein, respectively. Another group which is a major contributor is meatless products. It includes "processed" foods (the largest contributor in this group), bacon bits, meatless sausages, frankfurters, chicken, etc. These products provided 12% of the total isoflavone intake, 13% of the daidzein intake, 12% of the genistein intake, and 30% of the glycitein intake. Foods such as chicken and coffee, which contain small amounts of isoflavones but are widely consumed, were major contributors. Chicken provided 12% of total isoflavone intake, while coffee provided 5%.

Methods

To develop a list of key contributors of isoflavones to the diet, the Key Foods approach was used (1). The following sources were used:

- Isoflavone data from the 2008 USDA Database for the Isoflavone Content of Selected Foods, Releases 2.0
- The link file from Release 3 of the Food and Nutrient Database for Dietary Studies (FNDDS) provided in 2008 by the USDA
- The corresponding daily intake data, weighted for the U.S. population for 557 foods in the isoflavone database, were used in the following procedure:
  - Sum the amount consumed for each ingredient in all foods to give the total amount consumed per day
  - Multiply the amount of each ingredient or food by the isoflavone content in the food to give its percent isoflavone contribution to the total intake

- Group foods (i.e. all types of soy milk, meatless products) and assigns a unique code
- Sum grams and percent of total grams consumed for each group

Results

Average per capita intake of total isoflavones for the U.S. population was estimated to be 0.68 mg/day. Daidzein and genistein are the major isoflavones found in foods, with lesser amounts of glycitein. The rank order of foods contributing individual isoflavones (Tables 1-3) was similar. Soymilk, the largest contributor, comprised 22%-22%, 24% and 18% of the total isoflavones, daidzein, genistein, and glycitein, respectively. Another group which is a major contributor is meatless products. It includes "processed" foods (the largest contributor in this group), bacon bits, meatless sausages, frankfurters, chicken, etc. These products provided 12% of the total isoflavone intake, 13% of the daidzein intake, 12% of the genistein intake, and 30% of the glycitein intake. Foods such as chicken and coffee, which contain small amounts of isoflavones but are widely consumed, were major contributors. Chicken provided 12% of total isoflavone intake, while coffee provided 5%.

Conclusion

Soy products, such as soymilk, meatless vegetarian products, and tofu are the major contributors of isoflavones to the diet. Other food items, where soy products are used as ingredients (such as doughnuts, frankfurters, infant formula, bread and cereals), provide lesser amounts of isoflavones to the diet. Table 4 provides the Isoflavone content of selected foods, based on common measures. Traditionally soybeans and soy products were thought to be the main source of isoflavones in the diet. However, the widespread use of soy-based ingredients such as soy flour and soy isolate proteins in a variety of food items, other than traditional soy foods, may contribute to the isoflavone intake in the diet. Soy products are consumed in relatively low amounts by the U.S. population. By multiplying total isoflavone content by the grams consumed, the iso-flavone intake of 0.68 mg/day is reached. This value is similar to the median intake of 0.68 mg/day of four isoflavones obtained in the E3N-EPIC cohort of 41,711 women in France (2).

References


Table 1. Percent of total isoflavones intake contributed by foods

<table>
<thead>
<tr>
<th>Group</th>
<th>Code</th>
<th>Description</th>
<th>Average</th>
<th>Percent of total grams consumed</th>
<th>Average (mg/100 g)</th>
<th>Code</th>
<th>Description</th>
<th>Average</th>
<th>Percent of total grams consumed</th>
<th>Average (mg/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-SM</td>
<td>Soy milk (all types and flavors)</td>
<td>21.51</td>
<td>729.4</td>
<td>22.26</td>
<td>Soymilk (all types and flavors)</td>
<td>21.51</td>
<td>729.4</td>
<td>22.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-SB</td>
<td>Soybeans</td>
<td>5.09</td>
<td>66.1</td>
<td>7.80</td>
<td>Soy products, such as soymilk, meatless vegetarian products, and tofu</td>
<td>27.30</td>
<td>58.7</td>
<td>9.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 16-ML | Meatless products (includes veggie burgers and other imitation vegetarian products) | 24.20 | 65.1 | 9.62 | Other food items, where soy products are used as ingredients (such as doughnuts, frankfurters, infant formula, bread and cereals), provide lesser amounts of isoflavones to the diet. Table 4 provides the Isoflavone content of selected foods, based on common measures. Traditionally soybeans and soy products were thought to be the main source of isoflavones in the diet. However, the widespread use of soy-based ingredients such as soy flour and soy isolate proteins in a variety of food items, other than traditional soy foods, may contribute to the isoflavone intake in the diet. Soy products are consumed in relatively low amounts by the U.S. population. By multiplying total isoflavone content by the grams consumed, the iso-flavone intake of 0.68 mg/day is reached. This value is similar to the median intake of 0.68 mg/day of four isoflavones obtained in the E3N-EPIC cohort of 41,711 women in France (2).