

Caffeine Content of Commonly Purchased Weight Loss and Sports Performance Enhancing Dietary Supplements

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Abstract

Consumers who require dietary caffeine restrictions may obtain information on caffeine intake of food and beverages from NDL's online searchable database: <http://www.nal.usda.gov/fnic/foodcomp/search>. Additionally, consumers should be aware that dietary supplements might contain caffeine. As part of the collaborative effort to develop an analytically validated Dietary Supplement Ingredient Database (DSID), the Nutrient Data Laboratory of USDA evaluated the caffeine content of 63 dietary supplement products commonly marketed for weight loss or sports performance. **Learning Outcome:** Dietitians and healthcare professionals will recognize dietary supplements which contain caffeine and apply this knowledge when counseling clients. **Methods:** Caffeine-containing dietary supplements were selected when labels listed one or more of these ingredients: caffeine, guarana, yerba mate, cocoa, kola, tea. Samples were analyzed with blinded standard reference materials for caffeine content by high performance liquid chromatography. Expected daily intake of caffeine from the use of the supplements was calculated using claimed values and analytical values along with maximum recommended label amounts. **Results:** Laboratory analysis of 63 products showed a range of 0 - 204 mg caffeine/pill. Among 63 products analyzed, 33 had a label claim for caffeine content. Of these, 88% had a mean analyzed value within 20% of the claimed content. If taken at maximum recommended label amounts, 52% of the products provided >200 mg caffeine/day. **Conclusion:** Although the caffeine content of dietary supplements is not always listed on the label, these products can provide as much or more caffeine than a cup of brewed coffee. **Application:** Dietitians and health care professionals can use the list of caffeine-containing ingredients and the caffeine content of dietary supplements provided in this project to counsel consumers who require caffeine restriction. Funded through ODS/NIH Y4-HV-0051.

Introduction

Using NDL's online searchable database consumers can determine the caffeine content of many foods and beverages. Brewed coffee, for example, contains 95 mg of caffeine per 8 fluid ounces. Similar information for dietary supplements has not been available for consumers who may want to track their caffeine consumption. Caffeine (1,3,7-trimethylxanthine) is often added to dietary supplements to increase energy and suppress appetite. Consumers, as well as their health care providers, may be unaware that these supplements can contain caffeine, even if caffeine is not listed as an ingredient. The key terms listed in Table 1 were used to identify dietary supplement products containing caffeine for this study. As a part of a collaborative effort to develop analytical values for an ingredient database of dietary supplements, the caffeine content in over 60 dietary supplements was evaluated.

Table 1. Caffeine Containing Dietary Supplement Ingredients

Ingredient	Synonyms
coffee beans	coffea
cocoa	cacao, Theobroma cacao
guarana	paullinia cupana
kola nut	Cola Seeds, Cola nitida
green tea	Camellia Sinesis, Thea
black tea	Sinesis, Camellia
yerba mate	Mate, Ilex paraguariensis

Methods and Materials

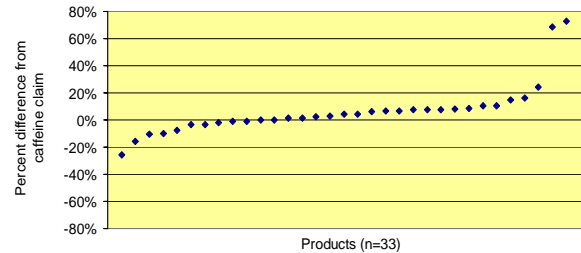
Because sports and weight loss supplements represent the segment of the dietary supplement market that is most likely to contain caffeine, 63 weight loss and sports performance enhancing dietary supplement products were selected. The sample of products was drawn according to retail channel, stratified by 2001 market data from the Nutrition Business Journal¹. Products were chosen based upon the market share for four categories: 1) health food/natural foods and vitamin stores (30.1%, n=18); 2) traditional supermarkets, grocery stores, drug stores and mass merchandisers (25.4% n=15); 3) multi-level marketers and direct (internet, catalog) sales (41.3% n=25); and 4) practitioners (3.2% n=2). For the categories with n>2, top-selling products were identified to be sampled. Additional samples were randomly selected.

Three lots for each product were planned for purchase over a 9 month period. Blinded samples and reference material were sent to an independent laboratory for high performance liquid chromatography analysis of caffeine. Daily caffeine intake from each supplement was calculated using claimed and analytical values, along with maximum number of pills per serving and per day based on product label information.

Results

Of the 63 products, 15 products were re-formulated or had label changes during the 9 month study, and therefore 3 lots of the original product were not available. However, only 6 of the 15 re-formulated products had changes to caffeine-containing ingredients. For the purposes of this study, the reformulations that did not affect caffeine ingredients were considered three lot products. Another 16 of the 63 products did not have 3 lots in this study because the product was discontinued or a different lot was not available. Laboratory analysis showed product means ranging from 0 - 204 mg caffeine/ pill. Of the 33 products with a quantifiable label claim for caffeine, 88% showed a mean analytical value within 20% of the claim (Figure 1).

Figure 1. Dietary Supplement Caffeine Levels: Difference Between Analytical Value and Label Claim



Figures 2 and 3 show caffeine/serving and caffeine/day respectively for supplements with and without a caffeine claim. Seventeen of the products without a caffeine claim in the 0-100 mg/serving group had less than 50 mg caffeine/serving and 5 products had 50-100 mg caffeine/serving. In the 0-100 mg/day grouping of the products without a caffeine claim, 15 products would provide less than 50 mg caffeine/day and 3 products would provide 50-100 mg caffeine/day if taken at maximum recommended serving sizes and servings/day. Four of the products identified caffeine content based on a cup of coffee. For those products with a coffee claim, results of caffeine analysis per pill are presented in Figure 4.

Figure 2. Caffeine Content Per Serving of Dietary Supplements (n=63)

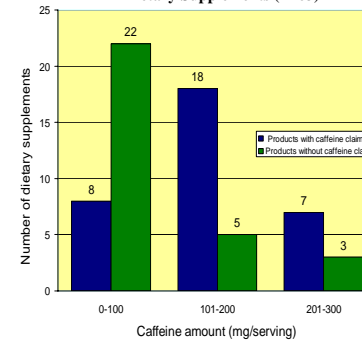


Figure 3. Potential Daily Intake of Caffeine from Dietary Supplements (n=63)

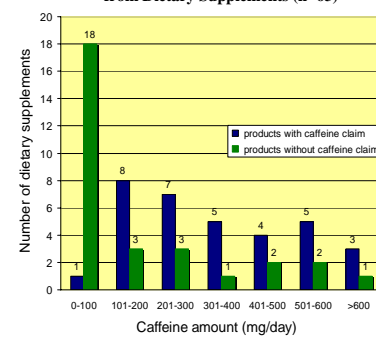
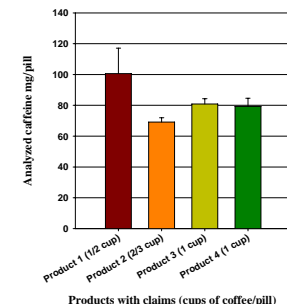


Figure 4. Caffeine Content of Products with Claims Based on a Cup of Coffee



Conclusions

1. If taken at maximum recommended label amounts, 52% of the products studied would provide >200 mg of caffeine/day, which is more caffeine than 2 cups of brewed coffee.
2. When counseling consumers to avoid caffeine, dietitians and other healthcare providers should use the list of caffeine-containing ingredients and synonyms in Table 1.
3. 73% of products without a quantifiable caffeine claim contained the amount of caffeine per serving, equal to or less than a cup of coffee. When potential daily caffeine intake was calculated for these products, 60% would provide the amount of caffeine equal to or less than a cup of coffee per day.

¹Nutrition Business Journal <http://www.nutritionbusiness.com> (accessed January 29 2004).