



Prevalence of Vitamins E and B₁₂ in Dietary Supplements reported in National Health and Nutrition Examination Survey (NHANES)



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Abstract

Public health concerns regarding possible risk from high Vitamin E intake and Vitamin B₁₂ deficiency warrant evaluation of contribution of dietary supplements to intakes of these vitamins. In the 2001-02 National Health and Nutrition Examination Survey (NHANES), between 34 and 36% of the U.S. population reported taking a supplement containing Vitamin E or Vitamin B₁₂ within the past 30 days. A Dietary Supplement Ingredient Database (DSID) is being developed by the USDA Nutrient Data Laboratory with the Office of Dietary Supplements and other federal agencies. Dietary supplements containing Vitamin E or B₁₂ were identified using label information from the 2001-2002 NHANES. Of the 2200 reported supplement products, 695 products contained Vitamin E and 692 products contained Vitamin B₁₂. The most commonly reported products containing Vitamin E (n=195) had label declarations of 30 and 15 International Units per serving, in ranked order. Most commonly reported products containing Vitamin B₁₂ had label amounts, in rank order, of 6, 25 and 4.5 micrograms per serving. For both vitamins, the most commonly reported products were 100% of the U.S. Daily Value (DV), declaring amounts of Vitamins E at 30 IU and B₁₂ at 6 micrograms.

Introduction

The tolerable Upper Intake Levels (UL) for Vitamin E has been established to guide the use of Vitamin E as a supplement and food fortificant. In contrast, concerns about adequacy of Vitamin B₁₂ intake has led to recommendations that adults over 50 years of age in the US meet their Vitamin B₁₂ requirement by consuming a supplement or fortified foods. Because of these guidelines, it is prudent to monitor the intake of nutrients provided by dietary supplements. As part of the Dietary Supplement Ingredient Database (DSID) working group, the Nutrient Data Laboratory is working with the Office of Dietary Supplements at the National Institutes of Health, the National Center for Health Statistics, Centers for Disease Control and Prevention, and the Food Composition Laboratory to develop an analytically validated database for dietary supplements. The DSID will report the results of a systematic survey of dietary supplement composition, including chemical analyses of the individual ingredients in supplements and data quality indicators. In the early stages of this project, nutrient label values and information about the frequency of use of specific dietary supplements were obtained from NHANES 2001-02 data on the dietary supplements questionnaire results (1). A pilot study assessing sample handling, analytical methods and data variability for 23 nutrients provided valuable information for subsequent studies. In the current study, nutrient values for supplement products reported in NHANES in 2001-02 were combined with frequency of use data to obtain a nationally representative distribution of most commonly used supplements containing Vitamins B-12 and Vitamin E. The most common amounts for these vitamins were also identified in order to select representative products for analysis

References

1. http://www.cdc.gov/nchs/about/major/nhanes/quest01_02.htm
Accessed May 2004

Methods and Materials

NHANES 01-02 dietary supplement questionnaire data files and demographic files were imported into MS Access® and used to obtain information on prevalence of use of dietary supplements containing Vitamins E and B₁₂. Nationally representative prevalence was estimated using person-level sampling weights to account for differential probabilities of selection and non-response, post-stratified to US Census Bureau population estimates. Numbers of supplements, respondents and weighted frequencies of use were summed for each Daily Value (DV) level. (DV is the recommended daily amount based on a 2000-calorie diet.)

All forms of tocopherol reported in the various supplements were considered to be Vitamin E. Since the most common form of Vitamin E in supplements is *all rac-α-tocopherol*, the conversion factor of 0.45 was used to calculate milligrams from IU. Because labels differed in how nutrient units per product were reported, nutrient values were first converted to common units, and then further converted to %DV. Structured Query Language (SQL) searched % DV levels, provided dietary supplement products and summed their weighted frequency of use at each %DV level. For every nutrient, the total weighted frequency of use was then calculated. The weighted frequency at the specific %DV levels was converted to the percentage of the total weighted frequency.

Results

Of the 2200 reported supplement products in the NHANES, 695 products contained Vitamin E and 692 products contained Vitamin B₁₂. Between 34% and 36% of the U.S. population reported taking a supplement containing Vitamin B₁₂ and E within the 30 days prior to the survey.

Figure 1. Distribution of Percent Daily Values Vs. Weighted Frequency of Use in Supplements Containing Vitamin E

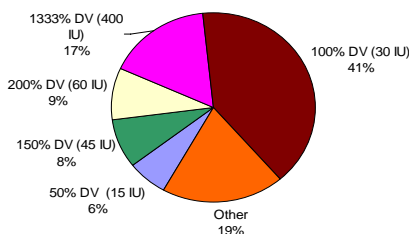
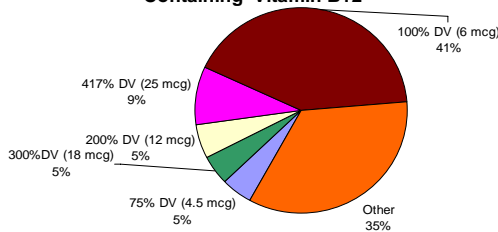


Figure 2. Distribution of Percent Daily Values Vs. Weighted Frequency of Use in Supplements Containing Vitamin B12



Distribution of nutrient label levels vs. weighted frequency of use of reported products showed 5 major levels for each vitamin as shown in Figures 1 and 2. For Vitamin E, the range for reported levels of % DV ranged from 3 to 3433%. The most common levels of Vitamin E in IUs are 30, 400, 60, 45, and 15 respectively, compared to the UL of 1500 IU, which is 50 times the recommended Daily Value for Vitamin E. For Vitamin B₁₂, the range for reported DV levels ranged from 2 to 4166%. Although the top five %DV levels were specified in this summary, many more levels were reported, with each of those levels representing less than 5% of the total weighted frequency.

Results

Figure 3. Number of Supplements Containing Common %DV levels of Vitamin E

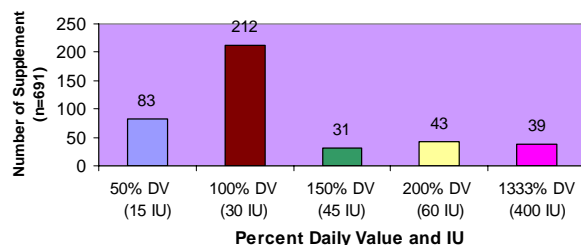
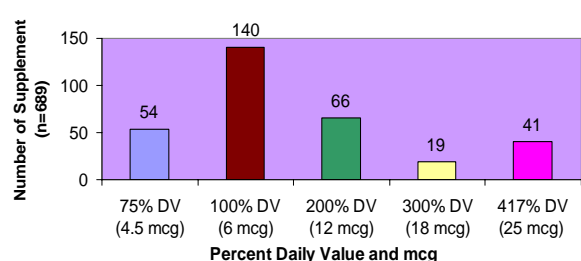


Figure 4. Number of Supplements Containing Common %DV levels of Vitamin B12



Figures 3 and 4 show the number of supplements containing Vitamin E and B₁₂ at the five most common levels. An additional 283 products constitute the remaining levels of Vitamin E, and an additional 369 products compose the remaining Vitamin B₁₂ levels.

Discussion and Conclusions

About 40% of the respondents taking a Vitamin E or B₁₂ supplement used a supplement at the 100% DV level, which was the most common level consumed. The most commonly reported products for both vitamins were 100% of the DV, declaring amounts of Vitamins E at 30 IU and B₁₂ at 6 micrograms.

In the %DV study to assess the systematic relationship of label values vs. analyzed values, NHANES data for 23 vitamins and minerals commonly found in multivitamin/mineral (MVM) products were analyzed to determine the most common %DV levels. The most common level was 100% DV for 16 of these nutrients.

This type of data analysis allows for the identification and evaluation of representative MVM products by individual nutrient to set future research priorities.

Future Plans

1. Subsequent studies are planned for data analysis and chemical analysis of children's MVM products, calcium products, other single and double nutrient supplement products (including Vitamin E products), and fish oil supplements. When analytical methods and reference materials are available, botanical ingredients and other supplements such as glucosamine and chondroitin products will be studied.
2. The primary use of this database will be to support research on US intake of nutrients from supplements and food. The data will be incorporated into a publicly available online database.