A dietary supplement nutrient composition database is needed to support research studies investigating the links between cancer and dietary intake of food and supplements. The Nutrient Data Laboratory (NDL) at the Food Composition Laboratory of USDA, the Office of Dietary Supplements, the National Center for Health Statistics (NCHS) and National Institute of Standards and Technology (NIST) are collaborating to develop an analytically validated Dietary Supplement Ingredient Database (DSID), in conjunction with the dietary supplement label database maintained by NCHS. This study reports the evaluation of the relationship between nutrient content values indicated on labels of multivitamin/mineral (MVM) products and the actual analytical values for nutrients in these products. In this study, we used NHANES 2001-2002 data on reported frequency of MVM intake of adults and nutrient content data from MVM labels for Vitamin D and 22 other vitamins and minerals. In the NHANES survey, about 1800 adult respondents representing about 35% of the US adult population, reported taking at least one MVM product during the previous month. A total of 1726 respondents, representing 30% of US adults, took vitamin D-containing MVM. The total number of supplements taken was 2,026 with about 540 MVM adult products (24%). Of these, 349 products contained Vitamin D, in most cases as ergocalciferol (D2), vitamin form found in 250-250 International Units (IU) to 1000IU. Among these adult MVM, the common levels of vitamin D in rank order were 100, 50 and 62.5 % Daily Value (DV). For vitamin D, however, the most commonly reported single month for most other nutrients was 100% DV. To validate the composition of MVM products, a product study to determine levels of 23 nutrients was conducted. The results indicated that most nutrients (16) had 0-10% coefficient of variation (CV). However, a few nutrients, including vitamin D, showed variability higher than 20% CV. Validation of dietary supplement composition is necessary for accurate assessment of total intake of Vitamin D and other nutrients from dietary supplements and food and their effects on health status.

Results and Discussion

Nutrient label values and information about the frequency of intake of specific dietary supplement nutrients were obtained from NHANES 01-02 survey data. The DSID working group prioritized supplement nutrients using a series of weighted factors, including exposure, research interest, measurement capabilities and public health importance. Vitamin D and 22 other nutrients were the high priority nutrients for evaluation. A pilot study assessing sample handling, analytical methods and laboratory variability for Vitamin D and 22 other nutrients in MVM products to assess the laboratory coefficients of variation as a prelude to a larger study of nutrient composition of dietary supplements.

NHANES 01-02 dietary supplement questionnaire data files and demographic files were used to determine the reported prevalence of beta carotene, folic acid, Vitamin A, B6, B12, C, D, E, K, riboflavin, thiamin, niacin, calcium, iron, potassium, phosphorus, copper, selenium, chromium, magnesium, manganese, zinc and iodine in adult MVM products. The NHANES data files link each product reported to individual survey respondents who statistically represent a portion of the population. 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 for all 23 nutrients were summed at each % DV level. Multivitamins containing common %DV levels were statistically selected for the NDV study. A pilot study to assess sample handling, analytical methods and laboratory variability for Vitamin D and 22 other nutrients in MVM was conducted. A total of 8 laboratories participated in this study. One standard reference material and one custom MVM product with blind duplicates were sent to the chosen laboratories 5 times to assess between-day and within-day variability. The following information was collected for sample handling: number of pills homogenized, homogenization method, equipment, and time of homogenization. For each nutrient, laboratory in-house quality control information, extraction methods, analytical methods, and results of repeated measurements were recorded. Coefficients of Variation (CV) were analyzed using SAS 9.1 (SAS Institute Inc., Cary, NC, USA).

A %DV study based on these NHANES results is underway, which is assessing the systematic relationship of label value vs. analytical value. Regression analysis will be applied to the analytical results to establish additional estimates for nutrient levels in adult MVM products reported in the NHANES survey.

Future Plans

A %DV study based on these NHANES results is underway, which is assessing the systematic relationship of label value vs. analyzed value. Regression analysis will be applied to the analytical results to establish additional estimates for nutrient levels in adult MVM products reported in the NHANES survey. Subsequent studies are planned for the analysis of children’s MVM products and calcium products (including antacids). Nutrients to be analyzed in future studies include: other single and double nutrient supplement products (especially Vitamin D products), glucosamine and chondroitin products, and fish oil supplements. When analytical methods and reference materials are available, botanical ingredients will also be studied.

The primary use of this database will be to support research on the US intake of nutrients from supplements and food. The data will be incorporated into a publicly available online database.