Multivitamin-multimineral supplements: who uses them?[1–3]

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ABSTRACT

Dietary supplement use is increasingly common in the United States. Multivitamin formulations with or without minerals are typically the most common type of dietary supplement reported in surveys and studies that collect data relating to dietary supplement use. In the National Health and Nutrition Examination Survey (NHANES) 1999–2000, 52% of adults reported taking a dietary supplement in the past month, and 35% reported regular use of a multivitamin-multimineral (MVMM) product. NHANES III data indicate an overall prevalence of dietary supplement usage of 40%, with prevalence rates of 35% in NHANES II and 23% in NHANES I. Women (versus men), older age groups, non-Hispanic whites (versus non-Hispanic blacks or Mexican Americans), and those with a higher education level, lower body mass index, higher physical activity level, and more frequent consumption of wine had a greater likelihood of reporting use of MVMM supplements in NHANES 1999–2000. Data from children suggest a similar prevalence rate, but lower prevalence rates of usage were reported in studies of adolescents. Individuals who use dietary supplements (including MVMM formulations) generally report higher dietary nutrient intakes and healthier diets in studies in which dietary data were also collected. Among adults with a history of breast or prostate cancer, usage rates for dietary supplements in general and MVMMs are considerably higher (eg, 56–57% for MVMMs), and these subgroups are more likely to also report use of single vitamin and mineral supplements. Thus, MVMM use contributes a considerable proportion of nutrient intakes in the United States and may contribute to risk of excessive intakes. *Am J Clin Nutr* 2007;85(suppl):277S–9S.

KEY WORDS Multivitamins, dietary supplements, nutrient intakes, US population, demographic characteristics, breast and prostate cancer

INTRODUCTION

Dietary supplement use is increasingly common in the general population of the United States (1), and usage may be even more common in some subgroups (2). In most groups that have been surveyed, these supplements contribute a substantial proportion of the total vitamin and mineral intakes (1, 2). Thus, collecting and analyzing data on dietary supplement use is a critical component of the assessment of nutritional status, although obtaining accurate details, such as the dosage actually ingested via supplementation, can be challenging (3, 4).

The National Health and Nutrition Examination Survey (NHANES) collects data on dietary supplement usage from a nationally representative sample of the civilian, noninstitutionalized US population. In the current NHANES survey, participants are asked whether they have taken any vitamins, minerals, or other dietary supplements in the past month, including both prescription and nonprescription supplements (1). To capture total supplemental calcium intake, participants also are asked whether they have taken any antacids. Details regarding use are requested, including how long and how often the supplements have been used, and participants are asked to show supplement containers (which occurs in most cases).

In NHANES 1999–2000, 52% of adults reported taking a dietary supplement in the past month, and 35% reported regular use of a multivitamin-multimineral (MVMM) product (1). In categorizing the various formulations, MVMM products are defined as those containing 3 or more vitamins with or without minerals, although most multivitamins contained 13 vitamins and most MVMMs also contained 16 minerals. Prevalence of reported use of other types of vitamin and mineral supplements that were assessed ranged from 5.2% for B-complex vitamins to 12.7% for vitamin E, with 24.4% of the sample reporting use of calcium-containing antacids. Compared with previous NHANES survey data, these data indicate a trend of increasing use: NHANES III data indicated an overall prevalence of dietary supplement usage of 40%; prevalence rates were 35% in NHANES II and 23% in NHANES I (1, 5).

DEMOGRAPHIC CHARACTERISTICS

As observed in other surveys and studies (6–9), dietary supplement usage in NHANES 1999–2000 was associated with several demographic and lifestyle characteristics (**Table 1**). In multivariate analysis, women (versus men), non-Hispanic whites (versus non-Hispanic blacks or Mexican Americans), and those with a higher level of education, lower body mass index, and higher level of physical activity were associated with a greater likelihood of reporting use of dietary supplements, specifically, MVMM supplements (1). Consumption of beer and distilled spirits was not independently associated with MVMM use but higher frequency of wine consumption (≥5times/mo) was associated with a greater likelihood of use of these products [odds

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TABLE 1
Demographic and lifestyle characteristics associated with multivitamin-multimineral supplement use in multivariate analysis in the National Health and Nutrition Examination Survey 1999–2000[1]

Characteristic	Odds ratios and 95% CIs
Sex	
Male	1.0
Female	1.4 (1.2, 1.7)
Age[2]	
20–39 y	1.0
40–59 y	1.4 (1.1, 1.7)
≥60 y	1.7 (1.3, 2.2)
Race-ethnicity[2]	
Non-Hispanic white	1.0
Non-Hispanic black	0.6 (0.5, 0.7)
Mexican American	0.6 (0.5, 0.8)
Education[2]	
Less than high school	1.0
High school diploma	1.3 (1.0, 1.6)
More than high school	2.0 (1.5, 2.6)
Reported BMI[2,3]	
<25.0	1.0
25.0 to <30	0.8 (0.7, 1.0)
≥30	0.7 (0.6, 0.9)
Physical activity[2]	
None	1.0
Moderate	1.5 (1.2, 1.9)
Vigorous	1.7 (1.3, 2.3)

[1] $n = 4453$. Data from Radimer et al (1).
[2] P for trend <0.01.
[3] Calculated as kg/m^2.

ratio (OR): 1.4; 95% CI: 1.0, 1.8, P for trend 0.01). The relation between smoking status and MVMM use was marginally significant, with current smokers less likely to be users (OR: 0.7; 95% CI: 0.6, 1.0), and former smokers more likely to be users (OR: 1.2: 95% CI: 0.9, 1.5: P for trend 0.11), than were those who had never smoked (1). Most MVMM users reported that the supplements were taken daily during the past month and nearly one-half of users (47.4%) had taken them for ≥2 y.

Data on supplement use in young children show prevalences and predictors of dietary supplement use that are similar to those observed in adult populations. For example, 46% of 8285 preschool children in the 1991 Longitudinal Follow-up to the 1988 National Maternal and Infant Health Survey received MVMM products with or without iron (10). Several maternal characteristics that were associated with adult use (non-Hispanic white, older, more educated, greater household income) were associated with a greater likelihood of the child receiving a vitamin or mineral supplement (10). Child characteristics associated with a greater likelihood of receiving MVMMs were birth order (first-born versus others), selected eating behaviors (occasional eating problems or poor appetite), and chronic health problems.

Although comparisons across surveys and studies are constrained by different methodologies and often time frame, adolescents appear to have a lower prevalence of use of MVMM products and dietary supplements in general. In the 1994 Continuing Survey of Food Intakes by Individuals (CSFII), approximately one-third of the 423 adolescents surveyed reported using supplements, with 15.6% using them daily (11). Most of the supplement users (65.5%) reported using MVMM formulations. Use was associated with being female, region (higher in the West), and reporting higher dietary nutrient intakes and lower intakes of total and saturated fat (11). Cross-sectional observational data from 1532 adolescents in the third Child and Adolescent Trial for Cardiovascular Health Study indicate a prevalence of 17.6% for use of vitamin and mineral supplements, with 47% of the supplements being MVMM formulations (12). Adolescent vitamin-mineral supplement users in that study also had higher nutrient intakes from foods and were described as having higher nutrition awareness.

Across numerous surveys and studies, usage of dietary supplements in general has been consistently associated with several demographic and behavioral characteristics (6–12). Women, older age, higher education level, regular physical activity, and being non-Hispanic white have been associated with a greater likelihood of dietary supplement use, and individuals with a higher body mass index and current smokers are less likely to report use of dietary supplements. When dietary nutrient intakes have been examined, individuals who use dietary supplements generally report higher micronutrient intakes from food and healthier diets (2, 6–8, 11, 12).

EXCESSIVE INTAKES

The prevalence of consuming excess amounts of vitamins and minerals in association with supplement use has been addressed in a few reports. Because the most commonly used MVMM products provide amounts of vitamins and minerals that generally do not exceed (or minimally exceed) 100% of the Daily Value, excessive intakes are more likely to occur among MVMM users who also use single vitamin or mineral supplements rather than MVMM users who do not use other vitamin or mineral supplements. For example, analysis of data from NHANES 1999–2000 suggests that 11.3% of adults used supplements that led to a daily intake of ≥400 IU vitamin E/d (13). Given the high prevalence of use of MVMM supplements in that survey, a substantial proportion of those individuals were also likely to be using MVMM supplements in addition to obtaining higher doses of the vitamin from single vitamin E formulations. In fact, survey participants consuming ≥400 IU vitamin E/d from supplements were observed to also be likely to use supplements containing vitamin C (84.9%) and β-carotene (50.4%).

In the International Population Study on Macronutrients and Blood Pressure, 52% of the 2195 US adult study subjects reported use of dietary supplements (6). Nutrients for which the highest number of subjects had intakes from supplements that exceeded the Upper Limit were niacin (202 subjects), magnesium (53 subjects), zinc (34 subjects), and vitamin C (29 subjects).

USAGE ASSOCIATED WITH HEALTH STATUS

Among women, the CSFII (1994–1996) survey data link supplement use with several somewhat divergent characteristics and attitudes related to health status. Dietary supplement users (versus nonusers) were more likely to have been diagnosed with a disease and to be on some kind of diet but to perceive their health status as being good (9). Being diagnosed with a serious disease, such as cancer, can stimulate changes in patterns of supplement use as well as changes in other lifestyle behaviors. For example, in a population-based descriptive study of 350 individuals who had been diagnosed with cancer, 48% reported that they had

started taking new dietary supplements after the diagnosis (14). Subjects in that study were asked whether they had taken any dietary supplements within the preceding 12 mo and whether they had taken the product before the cancer diagnosis. Among the dietary supplements, multivitamin and vitamin E supplement usages were the most commonly reported changes in dietary supplementation. Similar to descriptive cross-sectional data from the general population, taking new dietary supplements was more likely to be reported by women (versus men), older individuals, those with a higher level of education, and those with a higher stage of cancer when diagnosed. Differences across cancer types also were observed, with diagnosis of prostate cancer less likely and diagnosis of breast cancer more likely to be associated with taking new dietary supplements than diagnosis of colorectal cancer.

Compared with survey data from the general population, data from certain target groups suggest substantially higher prevalence rates for dietary supplement use. For example, 81% of 435 women who had been diagnosed with early-stage breast cancer surveyed in 1995–1997 reported regular use of at least one dietary supplement, and 46% reported use of MVMM products (15); in the complete sample of 3088 women in that study, 57% reported use of a MVMM product. The use of single vitamin and mineral products, usually in addition to the MVMM product, was considerably more prevalent than in the general population. For example, 49% used a vitamin E supplement (compared with 13% observed in NHANES 1999–2000). As a result of this supplementation pattern, the distribution of micronutrient intakes in this population showed that a considerably higher proportion exceed recommended intakes (16).

Similar prevalence data for supplement use were reported in a study of 805 men who had been diagnosed with prostate cancer (17). In that survey study, 73% reported use of dietary supplements, with MVMM products the most common type of supplement reported (by 56% of the respondents). Use of single vitamin and mineral supplements was also common, with vitamin E, vitamin C, and calcium supplements the most commonly reported (used by 43%, 33%, and 26%, respectively).

Not all studies have found higher rates of dietary supplement use among cancer survivors compared with the general population, although different time frames may explain some of the inconsistency. Data from the National Health Interview Survey Cancer Epidemiology Supplement did not suggest differences in supplement use in 689 cancer survivors compared with 32 037 healthy individuals, although that analysis was based on data collected from 1987 to 1992 (18). The increasing prevalence of dietary supplement use that has been observed in the general population is likely to be mirrored in patterns of use in target subgroups, such as those with altered health status or disease conditions.

CONCLUSION

Continued efforts to monitor dietary supplement behavior and use of methods that may improve the accuracy of this assessment and monitoring should be encouraged. Evidence suggests that adults and adolescents with suboptimal intakes from food sources are less likely to be dietary supplement users. Also, some subgroups of the population who report higher prevalence rates for use of both MVMM products and single vitamin and mineral supplements may be at increased risk of excessive intakes. Although MVMM formulations do not typically contain excessive amounts of micronutrients, these products do contribute to the total vitamin and mineral intakes of these individuals.

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