5-2006

Dietary Supplement Use Among the Elderly

Diana Kristine Keith
Utah State University

DIETARY SUPPLEMENT USE AMONG THE ELDERLY

by

Diana Kristine Keith

**Thesis submitted in partial fulfillment
of the requirements for the degree**

of

DEPARTMENT HONORS

in

Nutrition and Food Sciences

Approved:

Thesis/Project Advisor	**Department Honors Advisor**
Heidi J. Wengreen, PhD, RD	***Noreen B. Schvaneveldt, MS, RD***

Director of Honors Program

Christie Fox, PhD

**UTAH STATE UNIVERSITY
Logan, UT**

2006

Authors' Page

Dietary Supplement Use Among the Elderly

Key Words: dietary supplements, elderly, alternative medicine

Words in Abstract: 208

Words in Text: 3,198

Author:

Diana Kristine Keith, Senior in Didactic Program in Dietetics
12 USU Aggie Village Apt C
Logan, UT 84341
phone: 435-797-6359
dklewis@cc.usu.edu

Heidi J. Wengreen, RD, PhD
8700 Old Main Hill Room 307
Logan, UT 84322
phone: 435-797-1806
fax: 435-797-2379
hwengreen@cc.usu.edu

Abstract

Introduction: According to NHANES data from 1999-2000, 52% of US adults reported taking a dietary supplement in the last month. Even greater use of dietary supplements is observed among older individuals. Dietary supplements contain a wide range of ingredients from vitamin and minerals (VM) to botanicals, herbs, amino acids, and other ingredients sometimes referred to as non-vitamin and minerals (NVM).

Methods: Data on VM and NVM supplement use was collected in a prospective study of elderly people living in Cache Valley, Utah. The reported supplements were researched to obtain ingredient information and then categorized into groups representing the types of ingredients in the supplement.

Results: Of the 2327 participants aged 74 years or older who answered the interviewer-administered survey conducted during 2001-2003, 86% (1990) reported regular use of one or more dietary supplements. Of the supplements reported, 75% were traditional supplements, 5% were mixed supplements, and 18% were other supplements. The ingredients could not be identified for 3% of reported supplements.

Conclusion: The elderly population has a high rate of supplements usage and the elderly population of Cache County, Utah, this rate is exceptionally high (86%). It is essential for researchers and health professionals to be aware of this trend among the elderly.

Introduction

Since the Dietary Supplement Health and Education Act passed in 1994, there has been a dramatic increase in the quantity and variety of dietary supplements available to consumers. This act served to broaden the definition of a dietary supplement to include botanical, herbal, and many other ingredients, and to greatly deregulate the supplement industry, making it easier for supplements to be placed on the market (1, 2).It is estimated that approximately $18.8 billion was spent on dietary

supplements in 2003 alone (1). The frequency of use of dietary supplements is higher among the elderly than any other segment of the population. According to the National Health and Nutrition Examination Survey (NHANES), a nationally representative, cross-sectional survey of U.S. health and nutrition, 52% of U.S. adults aged 20 years or older reported taking a dietary supplement in the last month compared to 63% of adults aged 60 years or older in the 1999-2000 time period (1).

There is inadequate scientific evidence to support the observed widespread use of dietary supplements among the elderly (3). Although dietary supplement intake contributes to the total intake of specific nutrients and may under certain circumstances sustain optimal health, other supplements are unsafe, and the inappropriate use of some supplements may results in adverse health consequences (4). The widespread use of dietary supplements among the elderly make it imperative to identify and control for the contribution of dietary supplements when examining nutritional risk factors for health and disease among the elderly.

Objectives in conducting this prospective analysis included determining the prevalence of dietary supplement use among the a population-based sample of elderly of Cache County Utah, identifying the types of dietary supplements used in this elderly population, and examining and comparing characteristics of non-users and users of different types of dietary supplements. Information on all medications and dietary supplements taken regularly was collected, making this analysis is unique since data collection was not limited by the type of supplement taken.

Methods:

Data on dietary supplement use was collected in a prospective study of elderly people living in Cache Valley, Utah. CCMS began in 1995 when interviews were conducted with 5092 participants over the age of 65 and has since included several waves of data collection. The data for this analysis was collected during 2002-2003. Information on dietary supplement use was obtained by asking

participants to retrieve the bottles of all medicines and dietary supplements they had used regularly since the last study visit (~ 2 years prior to the current visit). Regular use was defined as taking the dietary supplement at least once a week for a month or longer. Interviewers then recorded information about the name and brand of the dietary supplement from the product label and self-reported information on the dose and frequency of consumption in a medication and supplement inventory form known as the mechest inventory. If bottles were not available, interviewers recorded information in the as reported by the participant from memory.

An ingredient composition table was constructed using data from the NHANES 1999-2000 dietary supplement data release (http://www.cdc.gov/nchs/about/major/nhanes/nhanes99_00.htm) and posted product information from the World Wide Web. The NHANES data release contained a database of complete ingredient information for many national brands of supplements along with several default and generic formulations. Supplement codes used in CCMS were matched to corresponding NHANES codes or to an identical supplement posted on the World Wide Web.

Dietary supplement ingredients were classified as traditional vitamins and minerals (VM) as well as non-vitamin/mineral ingredients (NVM) including herbs, botanicals, amino acids, concentrates, extracts or combinations of these. Supplements were then grouped into the following categories according to the number and types of ingredients that they contained:

1) *Traditional*: single VM or combinations of VM with <3 NVM ingredients (e.g. vitamin C or Centrum Silver with lutein).
2) *Mixed*: combinations of >2 VM and >2 NVM (e.g. Ester-C Caps with vitamin C, calcium, bioflavonoids, acerola, rose hips, and rutin).
3) *Other*: single NVM or combinations of NVMs (e.g. garlic, ginkgo biloba, or bioflavonoids).
4) *As/with Medication*: VM reportedly taken as a medication (e.g. antacids and aminobenzoate

potassium or B12 shots).

5) *Unknown*: Unknown ingredients (e.g. preparation with vague names like "Q" or with no data available on the Internet or NHANES).

Supplements were categorized into types as described and the frequency of use of each type was quantified. Analysis of variance procedures were used to examine difference in variance of characteristics between supplement users verses supplement non-users, examining such characteristics as age, gender, and type of supplement use.

Results

Of the 2327 participants, 1990 (86%) reported regular use of at least one dietary supplement. Of the dietary supplements reported, 75% were *traditional* supplements, 5% were *mixed* supplements, and 18% were *other* supplements (see Figure 1). Of the non-medication supplement users, 728 (39%) reported regular use of at least one dietary supplement which contained a single NVM ingredient or >2 NVM ingredients in combination with VM.

Dietary supplement users were more likely to be female, younger, and have more education than those who did not use dietary supplements. NVM users were more likely to be younger and have more education than individuals that did not use dietary supplements and those that used only VM supplements. NVM users were also more likely to male than users of only VM supplements.

Of the reported supplement users, those who took NVM supplements used a higher mean (4.6 SD 3.4) number of supplements than those who took only VM supplements (2.4 SD 1.5). The most commonly reported VM supplements included multivitamin/multimineral combinations, vitamin E, calcium, and Vitamin C. The most commonly reported NVM supplements included Metamucil, ginkgo biloba, glucosamine, glucosamine chondroitin, and garlic.

Discussion

The prevalence of dietary supplement usage among this population (86%) is higher than that reported in other studies assessing supplement intake. For instance, the National Health Interview Survey found only a 33.9% prevalence of use for VM supplements and a 6.0% prevalence of use for NVM supplements in 2000 (5). This difference may be largely due to the many methodological inconsistencies between studies. In an analysis of several studies that have attempted to estimate the prevalence of supplement usage, Brownie et al. (6) determined that valid comparisons or research data cannot be compared due to lack of standardization in methods. Studies vary as to their definition of dietary supplement, the method of gathering data (e.g. telephone interview, mail survey, self-administered), the composition of the study population (e.g. age caps at 65 or 74, exclusion of pregnant and lactating women and children), categorization strategies for dietary supplements, and the recorded frequency and duration of use (6).

Other possible explanations of the greater prevalence of use in Cache Valley seniors could be the general trend for the elderly to use more dietary supplements than younger populations (1). The CCMS population is more aged than most other study populations, and the high prevalence of supplement use observed supports other similar observations. Other cultural and economical factors may also be at play. According to the Utah Natural Products Alliance, the 80-100 supplement companies in Utah make up the third largest industry in Utah (7, 8). DSHEA, the congressional act from 1994 that has allowed for great growth in this industry was championed by Utah Senator Orrin Hatch (7, 8). With the supplement industry so close to home, Utah citizens may be more likely than others to take dietary supplements, although this has not been substantiated.

While the exact reasons for such a high prevalence of dietary supplement usage are unclear, it is clear that supplement usage is a behavior that clusters itself with other health conscious behaviors. Supplement users in the CCMS sample were more likely to be female, younger, and have more

education than individuals that did not use supplements. These differences were even more apparent in the NVM users group which was more likely to be younger and have more education than either the VM only users group and the group of individuals that did not use supplements.

Data from the 1999-2000 NHANES elucidated similar results. It was found that greater use of supplements was associated with female gender, older age, more education, white race/ethnicity, any physical activity, normal/underweight, alcohol use, former smoking status, and excellent/very good self-reported health (1). The finding of older age being associated with supplement usage does not conflict with CCMS results since NHANES looked at the population as a whole and CCMS looked only at an elderly population and found that the younger members of the elderly population are most likely to use supplements. This is similar to results observed among elderly people in Oregon. Researchers there found that supplementation peaked in the 71-75 years of age range decreased with age among their population, with the greatest usage among 71-75-year-old individuals living in metropolitan areas (89.7%) (9).

A study of demographics and lifestyle factors related to diet and dietary supplement use among the population in Japan found that use of dietary supplements was associated with older age, lower body mass index, physical activity, less use of prepared food, higher stress level, and lower dietary intake overall than in non-users (2). Data from the VITAL study, a longitudinal study of older adults in Washington state, and the 1946 British Birth Cohort also showed associations with health-related behaviors, characteristics, and health status (2, 11).

The factors related to supplement usage may create a healthy user bias and thus confound results in studies if not controlled for properly (1, 2, 11). While many studies may control for usage of some types of supplement, they are mostly controlling for traditional and multivitamin/multimineral types of supplements and they may not be controlling for use of many other types, including NVM supplements.

The most commonly reported supplements in this study, namely multivitamin/multimineral combinations, vitamin E, calcium, and vitamin C, were similar to those found in other studies. In NHANES III, the 1999-2000 NHANES, the Veteran's Administrative Normative Aging Study, and a study of the aging Oregon population, multivitamins/ multiminerals were the most commonly reported VM supplements followed by vitamin C, vitamin E (1, 3, 9). All of these studies except for the 1999-2000 NHANES also found calcium to be among the most commonly reported supplements (1).

The findings of the most commonly reported NVM supplements in this study also closely resembled those found in other studies. They included Metamucil, ginkgo biloba, glucosamine, glucosamine chondroitin, and garlic. This is similar to the 2000 National Health Interview Survey were other herbal/botanical, echinacea, ginkgo biloba, garlic, ginseng, and St. John's wort (5).

In evaluating trends of supplement usage from NHANES III and the Veteran's Administrative Normative Aging Study, Dr. Katherine Tucker has suggested that the supplements most needed by the elderly tend to have low usage. While usage of multivitamins/multiminerals, vitamins C and E, and calcium are high and even increasing, use of vitamin B-12 and vitamin D, two nutrients of special concern to the elderly, is relatively low (3). The results from this study give further evidence of this trend as vitamin D and vitamin B-12 are not among the most frequently reported supplements.

Participants reporting intake of NVM supplements took an average of 2.2 more supplements than users of VM supplements alone. Information characterizing the differences between people who supplement with VM's only and those that supplement with NVM's is scarce. It is possible that individuals who consumes NVM's are more likely to self-medicate illnesses and therefore take many different herbal, botanical, and other similar products, although there is little evidence to support this since NVM users have not been well studied.

Studies of dietary supplement usage are inherently limited by their dependence on self-report or participants. In the elderly populations, participants are often handicapped by physical and mental limitations such as dementia that make it difficult to obtain reliable data. Furthermore, accurate ingredient information is difficult to obtain due to deregulation of the supplement industry and the lack of standardization between supplements (4). This study was also limited by the accuracy of the coding system used. Coders were not trained nutritionists like those used in the 1999-2000 NHANES (1) and little or no ingredient information was available to base codes on in order to accurately classify the supplements into different types. However, this study was strengthened since data was gathered on all types of supplements and medications used.

Conclusion

The elderly population, in general, has a high rate of supplements usage compared to the rest of the adult population. In the elderly population of Cache County, Utah, this rate is exceptionally high (86%). Participants in this study who reported taking dietary supplements were more likely to be younger, female, and have several other health-conscious behaviors. While supplement use is generally regarded as safe among the public, health professionals need to be aware of the potential risks and interactions involved in supplementation, especially among elderly individuals who take several medications as well as supplements. In nutrition research, it is important to identify and control for the contribution of all types of dietary supplements when examining nutritional risk factors for health and disease.

Clinical Application

Dietary supplement use has been increasing rapidly in recent years. The largest part of this increase has been seen among the elderly (12). In the Cache Valley population, 86% of respondents reported using one or more supplements at least one per week for a month or longer in the previous two

years. This rate of usage is extremely high, even when compared to the U.S. population where it is estimated that over 50% of adults use supplements at least once per month (1). Given the lack of data supporting this widespread use of VM and NVM supplements and the vulnerability of the elderly, it is important to recognize the use of supplements in practice in order to best meet the needs of elderly patients and clients.

Supplementation is particularly popular among the elderly for a number of reasons. Vitamins, minerals, herbs, amino acid, and the other myriad of ingredients found in supplements are largely perceived as natural and safe. Manufacturers are not currently required to state what is known about potential benefits or side effects and interactions of taking their supplements. Many of the elderly are afflicted with chronic, currently incurable diseases and may turn to alternative and complementary medicine practices for aid that traditional medicine cannot offer. This health conscious population is also prone to use supplements as a way of improving health and extending life with few to no side effects.

However, what many supplement users are unaware of is that there are potential hazards when using dietary supplements, especially when many are used in combination with each other and with other prescription and over the counter medications. In a study of dietary supplement use among elderly patients of the Veterans Affairs Greater Los Angeles Healthcare System, Ly et al. (4) determined that 54% of the patients were consuming a combination of supplements with other supplements or medications that had the potential for an interaction. This is especially of concern in the elderly since they are already likely to engage in polypharmacy, where multiple medications are being taken at the same time. Each additional supplement adds to the likelihood that an interaction will take place.

Examples of potential interactions include the anticoagulant effects of ginkgo biloba and garlic when in combination with NSAIDS, aspirin, or other anticoagulant drugs. Upon injury or surgery,

excessive bleeding may take place (4). In other cases, supplement ingredients may alter the absorption and clearance of certain nutrients or drugs, such as the effect that St. John's wort has in suppressing the clearance of cyclosporin, antidepressants, and several other drugs (5). Likewise, they may enhance or suppress the effectiveness of certain medications (4). Ly et al. suggest that pharmacists and physicians need to take an active role in obtaining information on patients about what dietary supplements they are taking in order to determine if there are potential interactions. An active approach is necessary since it is estimated that, without a prompt, only one half of patients report use of supplements and non-prescription medications to their physicians (13) and only one third tell their physicians if they are taking herbal supplements (14). Dietetic practitioners should also be alert to such situations and probe into dietary supplement usage.

Other dangers involved in the use of dietary supplements are the risks for toxicity of certain nutrients, bio-active compounds, herbs, and other ingredients. Many supplements have nutrients in amounts far exceeding the RDA and even the UL set for optimal intake. For instance, supplements marketed to the elderly often contain 5,000-10,000 IU of vitamin A, an amount shown to have desctructive effects on bone health (15). Physicians and dietetic practitioners can be instrumental in educating patients about safe, prudent, and effective use of dietary supplements.

Even with the many risks involved, use of dietary supplements can be highly effective in filling the nutritional gaps that often come as the result of the American diet and the natural changes that accompany aging and disease when engaged in appropriately. However, despite the widespread use of dietary supplements, most of the elderly are not receiving the full benefits that appropriate supplementation can provide. Nutrients that are often needed in supplemental amounts include such nutrients as vitamin B-12 and vitamin D since aging processes tend to increase the demand for these nutrients. However, supplementation of these vitamins is not as common, nor is it increasing as rapidly as supplementation of other products such as vitamin C, vitamin E, and glucosamine chondroitin, all of

which are much more controversial in their utility and, as in the case of vitamin E, in their safety (16).

Overall, caloric needs have decreased in later years, but nutrient needs have stayed the same or increased. Hence, the golden years become a perfect time to add dietary supplements to the diet in order to fill the gaps that are difficult to get to with food. However, since those who are most likely to use dietary supplements are also most likely to be healthy and practice many other health-related behaviors, it appears that those who need supplements the most are, in fact, taking them the least (11). Recommendations of what dietary supplements to take need to be based on individual needs and may be especially critical to evaluate in poorer, older, less health-conscious individuals.

Dietary supplement use is highly prevalent in the United States population, and even more so among the elderly. This trend is unlikely to decline any time soon. In order to be effective, health care providers including physicians, pharmacists, and dietetic practitioners need to be aware of their patients' habits and what supplements they are and aren't using. Supplementation can be highly beneficial when done correctly. However, a great deal of misinformation is available and promoted vigorously to elderly consumers. It is critical that patients be educated on how to use supplements appropriately so that they can make the best choices for their health.

References

1. Radimer K, Bindewald B, Hughes J, Ervin B, Christine S, Picciano MF. Dietary supplement use by US adults: data from the National Health and Nutrition Examination Survey, 1999-2000. *Am J Epidemiol*. 2004;160:339-349.

2. Gunther S, Patterson RE, Kristal AR, Stratton KL, White E. Demographic and health-related correlates of herbal and specialty supplement use. *J Am Diet Assoc*. 2004;104:27-34.

3. Executive summary: conference on dietary supplement use in the elderly – proceedings of the conference held January 14-15, 2003, Natcher Auditorium, National Institutes of Health, Bethesda, MD. *Nutrition Reviews*. 2004;62:160-161.

4. Ly J, Percy L, Dhanani S. Use of dietary supplements and their interactions with prescription drugs in the elderly. *Am J Health-Syst Pharm*. 2002;59:1759-1762.

5. Millen AE, Dodd KW, Subar AF. Use of vitamin, mineral, nonvitamin, and nonmineral supplements in the United States: the 1987, 1992, and 2000 National Health Interview Survey results. *J Am Diet Assoc*. 2004;104:942-951.

6. Brownie S, Myers S. Wading through the quagmire: making sense of dietary supplement utilization. *Nutrition Reviews*. 2004;62:276-282.

7. Anonymous. CRN discusses AERs on Capitol Hill. http://www.nutraingredients-usa.com/news/ng.asp?n=66304-crn-adverse-events-reporting-fda. Date accessed Apr. 12, 2006.

8. Anonymous. USANA Wins "Best of State" Award. www.usanahealthsciences.com/news/news/bestState.pdf. Date accessed Apr. 12, 2006.

9. Kishiyama SS, Leahy M, Zitzelberger TA, Guariglia R, Zajdel DP, Calvert JF, Kaye JA, Oken BS. Patterns of dietary supplement usage in demographically diverse older people. *Alternative Therapies*. 2005;11:48-53.

10. Ishihara J, Sobue T, Yamamoto S, Sasaki S, Tsugane S. Demographics, lifestyles, health characteristics, and dietary intake among dietary supplement users in Japan. *International Journal of Epidemiology*. 2003;32:546-553.

11. McNaughton SA, Mishra GD, Paul AA, Prynne CJ, Wadsworth MEJ. Supplement use is associated with health status and health-related behaviors in the 1946 British Birth Cohort. *J Nutr*. 2005;135:1782-1789.

12. Kelly JP, Kaufman DW, Kelley K, Rosenberg L, Anderson TE, Mitchell AA. Recent trends in use of herbal and other natural products. *Arch Intern Med*. 2005;165:281-286.

13. Dietary supplement, nonprescription drug use underreported. *Geriatrics*. 1999;54:70. Abstract.

14. Hoblyn JC, Brooks JO. Herbal supplements in older adults: Consider interactions and adverse events that may result from supplement use. *Geriatrics*. 2005;60:18-23.

15. Crandall, C. Vitamin A intake and osteoporosis: a clinical review. *Journal of Women's Health.* 2004;13:939-953.

16. Miller ER, Pastor-Barriuso R, Dalal D, Riemersma RA, Appel LJ, Guallar E. *Ann of Int Med.* 2005;142:37-46.

Figure 1. Type of Dietary Supplement Reported.

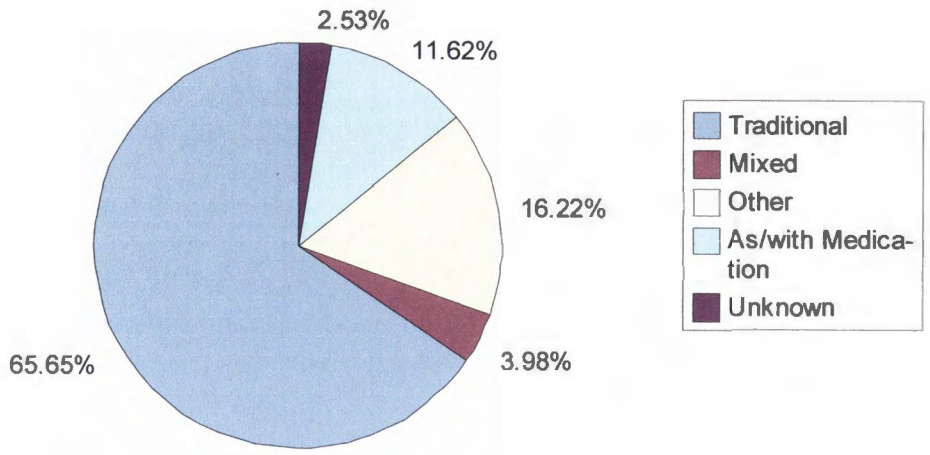

Table 1. Characterization of Participants by Supplement Usage			
	Non Supplement Users (n=432)	VM Only Users** (n=1152)	NVM Users*** (n=726)
Mean Age*	79.7 (6.4)	79.1 (5.8)	77.9 (4.9)
Female*	42.8%	64.6%	57.6%
Male*	57.2%	35.4%	42.4%
HS Education or greater*	80.1%	86.2%	90.6%
BMI	26.6 (4.3)	26.5 (4.4)	26.6 (4.2)
Number of Supplements taken*	0.0	2.4 (1.5)	2.6 (3.4)

* p-value <0.001
** individuals who took only *traditional* and/or *as/with medication* preparations
***individuals who took any *mixed* or *other* preparation with or without *traditional*, *as/with medication*, or *unknown* preparations