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Vitamin Supplement Use and Its Correlates Among Elderly Japanese Men Residing on Oahu, HI

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This work was supported in part by grant RO1-CA-33644 from the National Cancer Institute, National Institutes of Health, Bethesda, MD.

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Synopsis

Use of vitamin supplements and the association with personal characteristics were investigated among 4,654 American men of Japanese ancestry in Hawaii. A total of 58 percent of the subjects who were ages 68 to 90 took vitamin supplements. Among supplement users, multivitamins were most commonly used (77 percent), followed by vitamin C (53 percent), E (43 percent), and A (10 percent).

Ninety-two percent of users took at least seven pills per week when all types of pills were combined. Vitamin supplement users were more educated, more physically active, more likely to be married, and less obese than nonusers. They also slept less, smoked less, and drank less alcohol and caffeine. They took more analgesics and stomach medication and had fewer days of hospitalization in the previous 10 years compared with nonusers.

Except for physical activity, use of stomach medicines, and hospitalization, the other characteristics were also positively correlated with the amount of vitamin pill intake. These findings indicate that vitamin supplement users have different health patterns compared with nonusers.

ALTHOUGH REPORTS indicate that several kinds of vitamins may be protective against malignant neoplasms and coronary heart disease (*1*), other studies have produced equivocal findings (*2-6*). In spite of the uncertainty about the beneficial effects of vitamins against these diseases, large numbers of people are already using vitamin supplements. This use was observed in a number of nutritional surveys conducted in various populations (*7-29*), including specific occupational groups (*30,31*). Therefore, it is important to record vitamin intake from supplements in evaluating the relation between nutritional intake and disease.

Vitamin supplement users may differ from nonusers not only in the total amounts of vitamin intake, but also in other health behavior and practices, which are likely to affect their risk for disease. More information is needed on the charac-

teristics of vitamin supplement users. Previous studies have shown that the prevalence of vitamin supplement users varies with age (*7,9,19–22,27–29*), sex (*10,15–25,28,29*), and ethnicity (*9,20–23,28,29*).

Our study reports findings on self-reported vitamin supplement use and its relationship to other personal habits based on a mail questionnaire survey conducted as a part of an epidemiologic cohort study among American men of Japanese ancestry in Hawaii.

Methods

The original cohort of this study consisted of 8,006 Japanese men, born from 1900 to 1919, and residing on the Hawaiian Island of Oahu. They were identified by the Honolulu Heart Program and were interviewed and examined from 1965 to 1968. Details of this baseline survey are described elsewhere (*32*).

Between 1988 and 1990, a questionnaire was mailed to the 5,422 survivors of this cohort. The questionnaire was designed to be self-reportable. Incomplete or inconsistent answers were checked by a telephone interview. Ninety-two subjects (1.7 percent) had moved elsewhere or were unlocatable, while 190 (3.5 percent) were too ill to participate. Of the remaining 5,140 subjects, 4,656 (90.6 percent) completed the questionnaire. The age range of the subjects at time of participation was 68–90 years.

The questionnaire included the following items: marital status, weight, cigarette smoking history, vitamin supplement use, physical activity, and medical history. The daily intake of alcohol, measured in grams (g) (1 g = 0.04 ounces), and caffeine, measured in milligrams (mg), was estimated based on the frequency of consumption of the subject's usual serving size of beer, hard liquor, wine or sake, green tea, black tea, and regular coffee.

A physical activity index was calculated (*33*), based on the weighted sum of the usual amount of time the subject spent per week in the following types of activity: slight, as in walking on a level surface—weight of 1.5; moderate, as in gardening or carpentry—2.4; and heavy, as in shoveling or digging—5. Current body mass index (BMI) was calculated as weight, expressed in kilograms, recorded in the mail survey, divided by height in meters squared, at the baseline survey, based on the assumption that the person's height did not change between the two surveys. Educational history was obtained at time of the baseline survey.

Information was collected on vitamin supplement use during the previous year, based on types of vitamin supplements (multivitamins, vitamin A, C, and E) and the number of each type of pills consumed per week. After excluding 2 men with missing data on vitamin supplement use during the previous year, 4,654 men remained in the study. The total number of the four kinds of vitamin pills consumed per week was calculated for the subjects and they were classified into three groups: light (1–7 per week), moderate (8–21 per week), and heavy (22 or more per week) users.

Analysis of covariance (*34*) was used to calculate age-adjusted percent of vitamin supplement users by the categories of selected personal characteristics (for example, marital status, not married, married). Similar analyses were done for age-adjusted means of selected continuous variables (for example, BMI) and age-adjusted percent of selected characteristics (for example, percent of married). In addition, a multiple linear regression analysis was performed to test for trend based on total number of pills per week (coded as values of 1–4 for nonusers, 1–7 light users, 8–21 moderate users, and 22 or more heavy users pills per week) with adjustment for age (*35*).

Table 1. Distribution of vitamin supplement users by age group of Japanese men, Oahu, HI

Age	Number of study subjects	Vitamin supplement users	
		Number	Percent
65–69 years	587	350	59.6
70–74 years	2,130	1,197	56.2
75–79 years	1,139	673	59.1
80–84 years	564	339	60.1
85 and older	234	136	58.2
Total	4,654	2,695	57.9

Table 2. Distribution of 2,695 users of vitamin supplements by number of supplement types and type of vitamins consumed

Number and type of vitamins	Users	
	Number	Percent
Number of supplement types:		
1	1,276	47.3
2	725	26.9
3	536	19.9
4 or more	156	5.8
Unknown	2	0.1
Type of vitamins:		
Multivitamins	2,081	77.2
Vitamin A	276	10.2
Vitamin C	1,436	53.3
Vitamin E	1,165	43.2

Table 3. Age-adjusted percent of vitamin supplement users by other personal factors

Factors	Number of subjects	Percent of users	P[1]
Marital status:			
Not married	662	52.7	...
Married	3,992	58.8	<0.01
Highest school attended:			
Junior high or lower	2,181	53.9	...
Senior high or technical	1,964	59.5	<0.01
University	476	68.7	<0.01
Physical activity index:			
16.0 or less	1,535	54.7	...
16.1–40.0	1,584	59.8	<0.01
Greater than 40.0	1,535	59.2	0.01
Body mass index:			
Less than 22.0	1,517	59.9	...
22.0–24.5	1,574	60.1	0.91
24.5 or more	1,560	53.9	<0.01
Hours of sleep per day:			
Less than 7 hours	1,209	60.2	...
7–8 hours	2,657	58.3	0.28
9 or more hours	786	53.0	<0.01
Smoking status:			
Never	1,835	59.7	...
Past	2,353	58.4	0.40
Current	465	48.1	<0.01
Pack-years of cigarettes:			
0	1,835	59.7	...
Less than 35	1,388	59.2	0.79
35 or more	1,420	54.1	<0.01
Alcohol (g per day):			
Less than 0.5	2,819	58.2	...
0.1–51.9	917	60.8	0.16
12.0 or more	912	54.2	0.03
Caffeine (mg per day):			
66 or less	1,548	60.8	...
66.1–151.9	1,548	56.1	<0.01
152 or more	1,552	56.8	0.03
Use of pills to control blood pressure:			
No	2,795	57.8	...
Yes	1,858	58.0	0.89
Use of pills to control diabetes:			
No	4,192	57.9	...
Yes	461	58.3	0.85
Use of aspirin:			
No	3,474	57.0	...
Yes	1,179	60.6	0.03
Use of Tylenol or Darvon:			
No	4,080	56.7	...
Yes	573	66.5	<0.01
Use of stomach medicines:			
No	4,151	57.3	...
Yes	502	62.9	0.02
Hospitalization in previous 10 years:			
No	3,396	58.9	...
Yes	1,258	55.3	0.03
Self-reported health status:			
Good	2,611	58.2	...
Fair	1,752	57.1	0.47
Poor	291	59.9	0.57

[1] P value between the 1st category and each of the other categories, by analysis of covariance.

Results

A total of 2,695 (57.9 percent) subjects used vitamin supplements during the previous year. The percent of vitamin supplement users by age is shown in table 1. There was no trend in use by age.

The distributions of the supplement users by number of supplement types and by type of vitamins consumed are presented in table 2. About half (47.3 percent) of the users consumed only one type of supplement, and 5.8 percent of the users consumed four or more types of supplements. There was a total of 2,081 (77.2 percent) multivitamin users in the group. In all, there was a total of 276 (10.2 percent) vitamin A users, 1,436 (53.3 percent) vitamin C users, and 1,165 (43.2 percent) vitamin E users among subjects who took any vitamin supplements.

As shown in table 3, a high percentage of vitamin supplement users was observed for subjects with the following personal characteristics: married; more educated; more physically active; less obese; less sleep; less cigarette smoking; less alcohol and caffeine intake; users of aspirin, Tylenol, or Darvon, and stomach medicine; and not hospitalized within 10 years.

Eighty-eight percent of multivitamin users, 74 percent of vitamin A users, 86 percent of vitamin C users, and 83 percent of vitamin E users took at least seven pills per week (equivalent of one pill per day). When all types of pills were combined, 92 percent of users took at least seven pills per week. Table 4 presents a comparison of several variables between vitamin supplement users and nonusers and also by total number of pills consumed per week. Statistically significant trends by amount of pills consumed per week were present for the following characteristics: married status, university attendance, less BMI, fewer hours of sleep per day, less cigarette smoking, less consumption of alcohol and caffeine, and more use of aspirin and Tylenol or Darvon.

Discussion

Since the subjects of this study are respondents to two surveys (1965–68 and 1988–90), they are likely to be a selected population compared with a general population. Participants in a health program such as cancer screening generally have high health consciousness (*36,37*). Besides, subjects who died during the 20–25-year interval before the mail survey should include a higher proportion of men with poor physical condition and worse health

Table 4. Comparison of personal characteristics between vitamin supplement users and nonusers and by total number of pills consumed per week among users

Factors	Nonusers	Users	P [1]	Total number of pills per week			P value for trend [2]
				1–7	8–21	More than 22	
Number of subjects	1,959	2,695	...	1,133	1,048	511	...
Married[3]	84.0	87.0	0.04	87.1	87.3	86.3	0.03
University attendance[3]	7.6	12.2	<0.01	11.9	12.7	12.2	<0.01
Physical activity index	35.6	37.0	0.18	36.4	37.1	38.0	0.10
Body mass index	23.5	23.2	<0.01	23.0	23.3	23.3	0.02
Hours of sleep per day	7.5	7.4	0.03	7.5	7.4	7.3	<0.01
Current smoker[3]	12.3	8.3	<0.01	9.6	8.4	5.3	<0.01
Pack-years of cigarettes	26.2	22.4	<0.01	23.5	21.9	20.8	<0.01
Alcohol (g per day)	8.5	7.1	<0.01	7.5	7.6	5.0	<0.01
Caffeine (mg per day)	152.1	143.3	0.04	147.1	146.4	128.6	<0.01
Use of pills to control blood pressure[3]	39.8	40.0	0.89	39.6	39.9	41.2	0.73
Use of pills to control diabetes[3]	9.8	10.0	0.85	9.3	9.4	12.3	0.34
Use of aspirin[3]	23.8	26.5	0.03	25.3	27.9	26.2	0.03
Use of Tylenol or Darvon[3]	9.8	14.1	<0.01	13.9	15.0	12.9	<0.01
Use of stomach medicines[3]	9.5	11.7	0.02	12.5	11.7	10.0	0.23
Hospitalization in previous 10 years[3]	28.7	25.8	0.03	27.0	23.4	28.2	0.06
Good health status[3]	55.7	56.4	0.63	57.5	56.4	54.0	0.76

[1] From analysis of covariance, with adjusting for age.
[2] From multiple linear regression analysis, with total number of pills per week (coded as 1–4) and age included as independent variables.
[3] Percent.

habits than those who responded to the survey. Use of special diet (*24*), frequent visits to health food stores (*38*), participation in a Papanicolaou's smear test, and measurement of blood pressure (*24*), which are a reflection of health consciousness, were also associated with vitamin supplement use in earlier studies. Therefore, the prevalence of vitamin supplement users in our cohort may be overestimated, and the differences between users and nonusers may have diminished.

A number of nutritional surveys conducted in adult and elderly populations have shown that 35–80 percent of the subjects use vitamin supplements (*11–27,29–31*). The percent of vitamin supplement users in our cohort (58 percent) is comparable with these results, although the definition of supplement users and characteristics of study populations vary from study to study. Many studies included not only vitamins but also minerals and other nutrients (*7,11,14–20,22,23,25–29,31*).

Past studies have consistently found a higher prevalence rate of vitamin supplement users among females than among males (*10,15–25,28,29*). Rates ranging from 30 percent to 73 percent have been recorded for the men. It has also been reported that the prevalence of vitamin supplement users increases with age (*19–21,28*). Thus, the high mean age in our cohort may account for the high prevalence of supplement users, in spite of the fact that the rate of supplement use did not increase between ages 65–90. This is similar to the rate observed in a retirement community in California

'Cigarette smoking, alcohol drinking, and caffeine intake were associated with low vitamin supplement consumption. These habits have been risk factors for cancer and cardiovascular disease.'

(*24*). Our study also confirmed higher frequencies of multivitamin and vitamin C pill intake among users of supplements (*9,14,19,22,26–31*).

Ethnicity has also been associated with the prevalence of supplement use. It is higher in Caucasians than in other ethnic groups (*9,20–23,28,29*). Since our cohort consisted only of men of Japanese ancestry, no data were available on the prevalence of supplement use among other ethnic groups in Hawaii.

Higher socioeconomic status (higher income and higher educational level) has been associated with use of vitamin supplements (*20,22,23,28,29*). This has been observed in every generation. In the case of children, parents' socioeconomic status was related to vitamin supplement use (*7–9*).

In our study, educational level (university attendance) was positively associated with vitamin supplement use. Married men in our cohort were more likely to take vitamin supplements than single, separated, divorced, and widowed men. Surveys from general practices showed that the decision to

'. . . a survey among dietitians and other two population-based surveys showed that underweight subjects more frequently took vitamin pills. It is speculated that underweight subjects may view their regular diets as suboptimal.'

take vitamins was most influenced by family and friends rather than by physicians (*26,27*). Therefore, living with a spouse may be related to taking vitamins.

Cigarette smoking, alcohol drinking, and caffeine intake were associated with low vitamin supplement consumption. These habits have been risk factors for cancer and cardiovascular disease (*39–41*). This suggests that vitamin users would have a lower risk of major chronic diseases even if vitamin supplements do not exert any protective effect. Shapiro and coworkers reported that better health habits, including no smoking and no alcohol drinking, were strongly related to use of vitamin C pills (*21*). In a southern California retirement community however, vitamin supplement use was neither associated with smoking nor drinking habits but was inversely associated with regular coffee intake (*24*). Female predominance in that cohort may account for the results that differed from our findings.

Several studies have shown that subjects with high levels of physical activity are more likely to take vitamin supplements (*21,24,38*). Our study confirmed this positive association between the physical activity index and vitamin supplement use but did not show a dose response between these two variables. We also found a weak but significant inverse association between hours of sleep and vitamin supplement use. Fewer hours of sleep is a possible reflection of being more physically active. A high physical activity level should be attributable to recreational and domestic activities among our elderly population.

Vitamin supplement users, especially light users, weighed significantly less than nonusers in the present study. Likewise, a survey among dietitians (*31*) and two other population-based surveys (*28,29*) showed that underweight subjects more frequently took vitamin pills. It is speculated that underweight subjects may view their regular diets as suboptimal.

Shapiro and coworkers reported that persons in poor physical health, that is, persons having multiple chronic conditions, were more likely than others to take vitamin C pills daily (*21*). Ranno and coworkers reported that overusers of vitamin supplements had more medically diagnosed health problems than others (*42*). Fewer supplement users than nonusers rated their health as excellent in a study of adults in seven western States (*25*). Gray and coworkers showed that subjects who visited physicians once or more times per year were more likely to take vitamin supplements (*24*).

These results were not supported by our study. Self-reported health condition and use of pills to control hypertension and diabetes were not associated with vitamin supplement use. A history of hospitalization within 10 years was less frequent in moderate users. However, the use of nonprescription analgesics was more prevalent in vitamin supplement users than in nonusers. This was also observed in a southern California retirement community (*24*). Persons with minor health problems may be more conscious of their health than others and may be more likely to use self-medication for minor health problems.

This study indicates that vitamin supplement users are different from nonusers in some of their personal habits and demographic characteristics. These differences should be considered in evaluating effects of vitamin supplements.

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