

## Short Communication

**Dietary supplementation by older adults in Japan**

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This study documented the prevalence and pattern of dietary supplements usage among older adults in Japan. Persons aged 55-75 years residing in middle and southern Japan were recruited and interviewed face-to-face on their use of dietary supplements. Among the 572 (355 male and 217 female) participants from 10 prefectures, 45.8% took supplements on a weekly or daily basis, the prevalence was higher for women (52.5%) than men (41.7%). Many types of miscellaneous supplements were consumed. The most popular supplement was vinegar for both men (11.0%) and women (15.2%), followed by energy drink (8.5%) for men, and multivitamin (8.5%) for men and vitamin C (8.3%) for women. The findings suggested an increasing trend of dietary supplementation by Japanese older adults when compared to previous studies.

**Key Words:** dietary supplement, older adults, prevalence, Japan

**INTRODUCTION**

In recent years, the market for dietary supplements has increased in Japan. Many people consume multiple supplements in the hope to gain additional benefit. The nutritional effects of dietary supplements have been extensively investigated in clinical studies.<sup>1</sup> For example, vitamin E could reduce the risk of pneumonia among male smokers<sup>2</sup> and prevent coronary heart disease,<sup>3</sup> while vitamin A appeared to improve the pulmonary function of patients with chronic obstructive pulmonary disease.<sup>4</sup> The intake of food omega-3 polyunsaturated fatty acids could reduce blood pressure,<sup>5</sup> while on the other hand, high-dose vitamin E may pose an increased risk of mortality for those with severe cardiovascular disease.<sup>6</sup> Similarly, controversy has been developed over whether beta-carotene and retinol are protective against lung cancer or cardiovascular disease.<sup>7,8</sup> A recent systematic review of randomized prevention trials also reported that certain antioxidant supplements are associated with increased all-cause mortality.<sup>9</sup>

Despite the immense interests on dietary supplements, there has been relatively little information about their actual usage in the daily life of older adults in Japan. The overall prevalence of dietary supplement use was estimated to be 11% to 15% among Japanese adults aged over 50 years (8% to 12.5% for men and 11% to 17% for women) based on two studies conducted a decade ago.<sup>10</sup> Within the five categories of multivitamin, beta-carotene, vitamin C, vitamin E and other supplements, the most popular supplements reported were multivitamin for men and vitamin C for women.<sup>10</sup> However, characteristics and pattern of use by individuals were not examined in detail. The purpose of this report is to provide the latest update on the prevalence and type of dietary supplements taken by older adults in Japan. The findings have important implications to clinical trials and experimental inter-

ventions advocating nutritional supplementation therapy for the elderly population.

**MATERIALS AND METHODS**

Six hundred community-dwelling adults, aged between 55 and 75 years and residing in middle and southern Japan, were recruited into our cross-sectional study. This convenience sample of subjects were interviewed about their use of dietary supplements when they attended community centres, undertook health checks at hospitals, visited orthopaedic or physiotherapy clinics during 2006. Subjects were excluded if they had a recent stroke, dementia or other health conditions that prohibited them from answering the questions. Information from a total of 572 eligible participants (355 men and 217 women) from 10 prefectures were available for analysis, after further excluding subjects with missing demographic details. Approval of the study protocol was obtained from the Human Research Ethics Committee of the researchers' institution (approval number HR 90/2005).

A structured questionnaire was administered to collect demographic information, physical activity level, smoking status, alcohol consumption and dietary supplement use. All interviews were conducted face-to-face by the first author. The purpose of the study was explained to each participant before obtaining their written consent. Confidentiality of the information provided, and the right to

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withdraw without prejudice, were ensured and maintained throughout the study. Each interview took approximately 30 minutes to complete.

Specific dietary supplements were classified into five categories, namely, multivitamin, beta-carotene, vitamin C, vitamin E, and miscellaneous, following the convention adopted by the Japan Public Health Center-based prospective study on cancer and cardiovascular disease.<sup>11</sup> The brand name, frequency, duration and dosage of all supplements consumed by each participant were recorded. Users of dietary supplements were defined as subjects who used at least one category of dietary supplement on a weekly basis for one year or longer.<sup>11</sup>

## RESULTS

The majority of the 572 eligible participants were men (62%) with mean age 63.3 (SD 6.2) years and mean body mass index 23.4 (SD 3.1). Most of them were married (80%) and had attained high school (63%). A substantial proportion of participants (18%) were current smokers, while 60% consumed alcohol at least monthly. Moreover, 80% of subjects participated in physical activities on a weekly basis, but only 24% and 9% engaged in moderate and vigorous activities, respectively.

Overall, 262 (45.8%) participants were dietary supplement users, but the prevalence for females (52.5%) was higher than males (41.7%). Prevalence of the five dietary supplement categories by gender is given in Table 1. Apart from the miscellaneous category, the most popular supplement was multivitamin for men (8.5%) and vitamin C for women (8.3%). Within the ten most common miscellaneous supplements, vinegar was ranked the highest

for both men (11.0%) and women (15.2%), while energy drinks were quite popular among male participants (8.5%).

Table 2 presents the distribution of number of dietary supplements use. About 60% of male and 54% of female users took one type of dietary supplement. The number of users generally decreased as the total number of supplement types chosen increased. On average they took 1.8 (SD 1.2) supplements weekly and no significant difference between elderly men and elderly women was evident ( $p = 0.22$ ).

Data on the frequency and duration of intake for popular supplements are presented in Table 3. It appears that the popular supplements were often taken daily and consumed by users within the past 5 years.

## DISCUSSION

The overall prevalence of 45.8% was higher than the 11–15% reported by two Japanese studies conducted a decade ago, which adopted the same definition of dietary supplement user.<sup>10,11</sup> Moreover, the higher prevalence for women was consistent with previous studies in the Asia-Pacific region.<sup>10–14</sup>

The most popular dietary supplements among the five categories were multivitamin (8.5%) for men and vitamin C (8.3%) for women. Again, the prevalence estimates had increased from those (2.2% and 4.4%, respectively) reported previously.<sup>10</sup> Within the miscellaneous category, vinegar was the most popular supplement, followed by energy drink for men. Vinegar is a widely advertised beverage supplement in Japan. Similar to a previous Japanese telephone survey,<sup>12</sup> the male participants also preferred

**Table 1.** Prevalence of the five dietary supplement categories and ten most popular miscellaneous supplements consumed by older adults in Japan (n = 572)

Category	Male	Female	Both gender
Multivitamin	30 (8.5%)	10 (4.6%)	40 (7.0%)
Beta-carotene	2 (0.6%)	0 (0%)	2 (0.3%)
Vitamin C	14 (3.9%)	18 (8.3%)	32 (5.6%)
Vitamin E	11 (3.1%)	8 (3.7%)	19 (3.3%)
Miscellaneous <sup>†</sup>	129 (36.3%)	105 (48.4%)	234 (40.9%)
Vinegar	39 (11.0%)	33 (15.2%)	72 (12.6%)
Energy drink	30 (8.5%)	10 (4.6%)	40 (7.0%)
Garlic	16 (4.5%)	13 (6.0%)	29 (5.1%)
Tree kale juice	9 (2.5%)	10 (4.6%)	19 (3.3%)
Calcium	6 (1.7%)	13 (6.0%)	19 (3.3%)
Royal jelly	8 (2.2%)	5 (2.3%)	13 (2.3%)
Propolis	8 (2.3%)	4 (1.8%)	12 (2.1%)
Glucosamine	5 (1.4%)	6 (2.8%)	11 (1.9%)
Prune	2 (0.6%)	7 (3.2%)	9 (1.6%)
Turmeric	7 (2.0%)	2 (0.9%)	9 (1.6%)
Overall	148 (41.7%)	114 (52.5%)	262 (45.8%)

<sup>†</sup> 62 other supplements not listed

**Table 2.** Distribution of the number of dietary supplements taken by users (n = 262)

No. of supplements	Male	Female	Both gender
1	89 (60.1%)	61 (53.5%)	150 (57.3%)
2	32 (21.6%)	30 (26.3%)	62 (23.7%)
3	18 (12.2%)	10 (8.8%)	28 (10.7%)
4	3 (2.0%)	6 (5.3%)	9 (3.4%)
≥ 5	6 (4.1%)	7 (6.1%)	13 (5.0%)
mean (SD) per user	1.70 (SD 1.2)	1.88 (SD 1.3)	1.77 (SD 1.2)

**Table 3.** The frequency and duration of intake of popular supplements by users (n = 262)

Supplement	Male	Female	Both gender
<b>Multivitamin</b>			
Frequency			
0	118 (79.7%)	104 (91.2%)	222 (84.7%)
1-2 times/week	6 (4.1%)	1 (0.9%)	7 (2.3%)
3-4 times/week	2 (1.4%)	1 (0.9%)	3 (1.1%)
1 time/day	17 (11.5%)	4 (3.5%)	21 (8.0%)
2-3 times/day	5 (3.4%)	4 (3.5%)	9 (3.4%)
Duration			
0	118 (79.7%)	104 (91.2%)	222 (84.7%)
1-2 years	9 (6.1%)	1 (0.9%)	10 (3.8%)
3-4 years	6 (4.1%)	4 (3.5%)	10 (3.8%)
5-9 years	7 (4.7%)	2 (1.8%)	9 (3.4%)
≥ 10 years	8 (5.4%)	3 (2.6%)	11 (4.3%)
<b>Vitamin C</b>			
Frequency			
0	134 (90.5%)	96 (84.2%)	230 (87.8%)
1-2 times/week	1 (0.7%)	1 (0.9%)	2 (0.8%)
3-4 times/week	3 (2.0%)	1 (0.9%)	4 (1.5%)
1 time/day	4 (2.7%)	11 (9.7%)	15 (5.7%)
2-3 times/day	6 (4.1%)	5 (4.4%)	11 (4.2%)
Duration			
0	134 (90.5%)	96 (84.2%)	230 (87.8%)
1-2 years	6 (4.1%)	7 (6.1%)	13 (5.0%)
3-4 years	1 (0.7%)	3 (2.6%)	4 (1.5%)
5-9 years	3 (2.0%)	3 (2.6%)	6 (2.3%)
≥ 10 years	4 (2.7%)	5 (4.4%)	9 (3.4%)
<b>Vinegar</b>			
Frequency			
0	109 (73.6%)	81 (71.1%)	190 (72.5%)
1-2 times/week	9 (6.1%)	3 (2.6%)	12 (4.6%)
3-4 times/week	4 (2.7%)	1 (0.9%)	5 (1.9%)
1 time/day	24 (16.2%)	22 (19.3%)	46 (17.6%)
2-3 times/day	2 (1.4%)	7 (6.1%)	9 (3.4%)
Duration			
0	109 (73.6%)	81 (71.1%)	190 (72.5%)
1-2 years	18 (12.2%)	12 (10.5%)	30 (11.5%)
3-4 years	6 (4.1%)	6 (5.3%)	12 (4.6%)
5-9 years	11 (7.4%)	11 (9.6%)	22 (8.4%)
≥ 10 years	4 (2.7%)	4 (3.5%)	8 (3.1%)
<b>Energy drink</b>			
Frequency			
0	118 (79.7%)	104 (91.2%)	222 (84.7%)
1-2 times/week	9 (6.1%)	3 (2.6%)	12 (4.6%)
3-4 times/week	3 (2.0%)	2 (1.8%)	5 (1.9%)
1 time/day	17 (11.5%)	4 (3.5%)	21 (8%)
2-3 times/day	1 (0.7%)	1 (0.9%)	2 (0.8%)
Duration			
0	118 (79.7%)	104 (91.2%)	222 (84.7%)
1-2 years	5 (3.4%)	1 (0.9%)	6 (2.3%)
3-4 years	2 (1.4%)	4 (3.5%)	6 (2.3%)
5-9 years	8 (5.4%)	4 (3.5%)	12 (4.6%)
≥ 10 years	15 (10.1%)	1 (0.9%)	16 (6.1%)

energy drinks, probably because these drinks were advertised well with the suggested ability to revitalise exhausted men.<sup>12</sup> Although ginseng was the most common herbal supplement in Taiwan and Singapore,<sup>14,15</sup> only one woman consumed ginseng in our study, since it is relatively expensive and not readily available in Japan. Indeed, the choice of dietary supplement can be affected by ethnic or racial factors.<sup>16</sup>

In this study, detailed information on dietary supplementation was obtained from self report. As with other surveys of elderly subjects, the responses from our participants inevitably incurred some recall error. Therefore, face-to-face interviews were used to increase the response rate and to improve the accuracy of their answers. All interviews were conducted by the same investigator (first author) to eliminate inter-interviewer bias.

A limitation of our study was the lack of qualitative data on the perception and belief by the older adults. Opinions about dietary supplementation, facilitators and intentions behind dietary supplement use were not investigated due to time constraints. Another limitation concerned the adequacy of our convenience sample, which consisted of voluntary participants recruited from community centres and outpatient clinics. Although our elderly population is comparable with those from previous studies,<sup>10,11</sup> further replications are recommended to confirm the observed increasing trend. Taking these limitations into account, the findings suggest that dietary supplements become more common in Japan and a large variety of supplements are consumed by older adults.

#### AUTHOR DISCLOSURES

Fumi Hirayama, Andy H Lee, Colin W Binns, Fumiko Watanabe and Tomoya Ogawa, no conflicts of interest.

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## 日本中老年人膳食補充劑使用狀況

本研究記敘在日本的中老年人，使用膳食補充劑的盛行率及其型式。研究對象是徵募居住在日本中南部，年齡在 55-75 歲之間的長者，以面對面的訪談來了解他們使用膳食補充劑的情形。來自於日本 10 個縣的 572 位（355 位男性和 217 位女性）研究對象中，有 45.8% 的人每週或每天服用膳食補充劑；其中，女性使用膳食補充劑的盛行率（52.5%）高於男性（41.7%）。有各式各樣的補充劑被食用，在男性及女性中最普遍的補充劑是醋（男性 11.0%、女性 15.2%），在男性其次為能量飲料（8.5%）以及綜合維他命（8.5%），在女性則是維生素 C（8.3%）。與過去的研究做比較，本研究發現，日本中老年人膳食補充劑的使用有增加的趨勢。

**關鍵字：**膳食補充劑、中老年人、盛行率、日本