Original Article

Use of supplements by Taiwanese adults aged 19-44 during 2005-2008

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The aim of the study was to understand the use of supplements in Taiwan. Data used in this study came from the 2005-2008 Nutrition and Health Survey in Taiwan. The total sample available for analysis of supplement use included 973 adults (485 men and 488 women), aged 19-44 years. Survey data were weighted to adjust for the survey design effect and to make the sample nationally representative. Our results showed that 33.2% of Taiwanese adults aged 19-44 took supplements (26.6% of men and 40.0% of women). Gender was the only demographic factor found to be associated with the total number of supplement types taken. Men were more likely to take only one supplement. In contrast, women were 2.6 times more likely than men to take two or more supplements. The most commonly taken supplements by adults were multivitamins and minerals (35.8%), followed by vitamin B group (20.6%) and calcium (9.3%). We found that in both men and women, nutrient intakes from supplements exceeded DRIs for vitamins A, D, E, B-1, B-2, B-6, B-12, pantothenic acid and biotin. Men were more likely than women to take excess iron. Women were more likely than men to take excess vitamin C and niacin. Our study results may be used by government agencies to develop policies regarding supplement use in Taiwan.

Key Words: supplements, 19-44 year old adults, gender, multivitamins and minerals, nutrient intakes from supplements

INTRODUCTION

The size of the health food market in Taiwan has continued to grow,[1] reaching a value of NT$67.7 billion in 2008. From 2004 to 2008 the import value of health foods in Taiwan continued to climb, and in 2008 the import value surpassed NT$50 billion. At the present time, there is much inconsistency between countries in the nomenclature used to describe food products that purport to have health protective functions. Examples include "foods for special health uses" in Japan,[2] "health foods" in mainland China,[3] "dietary supplements" in the United States [4] and "health foods" in Taiwan.[5]

In 2006, Taiwan amended health food regulatory legislation to provide a precise definition for "health foods" [5] and the number of health foods passing government certification procedures has increased annually.[6] Up to March 25, 2010 a total of 170 health food items have been certified by the Department of Health.[7] However, the number of products on the market claiming positive health effects far outnumbers the health foods that have been certified.

Research shows that women and those living in more urbanized areas, with higher levels of education and higher individual income are more likely to take supplements.[8-16] The most common type of supplement taken is multivitamins and minerals and the most common frequency of use is "every day" or "regularly".[8,10,11,16] Most people take only one type of supplement, and the number of persons taking supplements decreases as the number of types of supplements taken increases.[8,11,16] The last survey on supplement use by adults aged 19 years and over in Taiwan was the 1993-1996 Nutrition and Health Survey,[16] which is now more than 10 years old. In the last 10 years there have been enormous changes in the variety of food products reporting health benefits and therefore, it is necessary to have accurate information on the current status of supplement use by adults in Taiwan.

The aim of the study is to understand the use of supplements by adults aged 19-44 in Taiwan including: a) the relationship between demographic characteristics and use

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of supplements; b) the number of supplements used; c) the types of supplements used; and d) nutrient intake from supplements. Our results will be a useful resource for future policy development.

MATERIALS AND METHODS

Study sample

Data used in this study came from the Nutrition and Health Survey in Taiwan 2005-2008 (NAHSIT 2005-2008) carried out by the Department of Health.[17] We carried out analyses on the use of supplements by adults aged 19-44 years. NAHSIT 2005-2008 used a multi-staged stratified sampling method on the basis of geographical location with consideration for population density in northern Taiwan; 358 townships in Taiwan were divided into five strata, namely: level one in northern territory (Taipei City and Taipei Country), level two in northern territory (excluding Taipei City and Taipei County, including the north of Hsinchu and Ilan), the middle area (from Miaoli to the north of Chiayi), southern area (from the south of Chiayi to Peng-hu) and eastern area (Hualien and Taitung). Among each strata, the three-stage sampling method was adopted. We compared the type of supplements used in this survey to that observed in adults aged 19-44 in the 1993-1996 Nutrition and Health Survey in Taiwan (NAHSIT 1993-1996).

Survey instrument and analysis methods

The survey instruments used in this study included a demographic questionnaire, and a questionnaire on use of supplements that was a part of the food frequency questionnaire. Descriptive statistics and logistic regression analyses were carried out to investigate the use of supplements, the number and the types of supplements taken by respondents. There were 973 persons in the sample (485 men and 488 women).

To categorize the supplements taken by respondents in NAHSIT 2005-2008, we assessed the nutrients contained in common supplements by interviewing managers of pharmacies, cosmetics stores, fairs and online stores to create a supplement database. Then, based on the frequency, dose and amount used, we estimated the mean daily nutrient intake from supplements. If the brand of the supplement was unclear and there was no way of obtaining nutrient data, we used the mean nutrient intake value for that particular supplement type. As there is an enormous number of nutrients contained in supplements, we only analyzed those nutrients that had listed Dietary Reference Intakes (DRIs) defined by the Taiwanese Department of Health.

The sample was weighted according to the census of population in 2006 to create national representative estimates, using weights generated for questionnaire data.[17] We used the weighted questionnaire data in this study (the total population in each stratum/the size of the questionnaire the stratum). We used SAS 9.1 for Windows (SAS Institute Inc, NC) to produce descriptive statistics. Survey Data Analysis (SUDAAN) statistical software

Table 1. Demographic characteristics and use of supplements in Taiwanese adults aged 19-44 years†

Characteristic		n	Take supplements‡		*p* value	OR (95% C.I.)
			No (%)	Yes (%)		
Gender	Male	485	377 (73.4)	108 (26.6)	0.001	1
	Female	488	310 (60.0)	178 (40.0)		1.84 (1.32-2.55)*
Region	First northern stratum	198	123 (60.4)	75 (39.6)	0.043	1
	Second northern stratum	193	151 (78.6)	42 (21.4)		0.42 (0.22-0.77)*
	Central stratum	195	141 (71.8)	54 (28.2)		0.60 (0.26-1.38)
	Southern stratum	194	122 (62.1)	72 (37.9)		0.93 (0.43-2.00)
	Eastern stratum	193	150 (78.3)	43 (21.7)		0.42 (0.22-0.81)*
Marital status	Single	434	316 (68.6)	118 (31.4)	0.443	1
	Not single	539	371 (65.3)	168 (34.7)		1.16 (0.78-1.72)
Education level	Junior high school and below	128	103 (74.2)	25 (25.8)	0.105	1
	Senior high school	382	285 (71.3)	97 (28.7)		1.16 (0.69-1.95)
	University or college	404	264 (62.1)	140 (37.9)		1.76 (0.96-3.20)
	Post-graduate	59	35 (58.6)	24 (41.4)		2.03 (0.91-4.52)
Employment status	Full-time employment	634	440 (66.1)	194 (33.9)	0.276	1.96 (0.88-4.37)
	Part-time employment	57	40 (62.9)	17 (37.1)		2.25 (0.92-5.46)
	Currently unemployed	85	68 (79.2)	17 (20.8)		1
	Student or not working due to further study	96	68 (63.7)	28 (36.3)		2.17 (0.76-6.18)
	Home duties	96	67 (66.5)	29 (33.5)		1.92 (0.71-5.15)
Monthly income	No income	225	166 (69.6)	59 (30.4)	0.443	1
	≤ NT$20,000	165	124 (71.5)	41 (28.5)		0.91 (0.53-1.57)
	>NT$20,000	583	397 (62.9)	186 (35.3)		1.25 (0.88-1.78)
Adequacy of financial resources	Adequate	710	481 (63.8)	229 (36.2)	0.004	1.65 (1.20-2.28)*
	Inadequate	243	188 (74.4)	55 (25.7)		1
Health status	Better than others	208	141 (64.2)	67 (35.8)	0.015	1.31 (0.83-2.09)
	The same as others	546	400 (70.2)	146 (29.8)		1
	Poorer than others	202	135 (60.2)	67 (39.8)		1.56 (1.20-2.02)*

†The sample included 973 persons of whom 286 took supplements (33.2%) and 687 didn't take supplements (66.8%).

‡.Number of persons and percentage. The number of persons was the actual number in the sample. The percentage refers to the weighted values.

*Indicates significant difference at $p<0.05$ compared to the reference group.

was used for weighting and logistic regression analyses. Statistical significance was set at $p<0.05$.

RESULTS

Demographic characteristics and use of supplements

We conducted descriptive statistics followed by logistic regression analyses to determine if gender, geographical region, marital status, education level, employment status, individual monthly income, perceived financial adequacy and self-rated health were associated with taking supplements.

Table 1 shows that overall, 33.2% of adults took supplements. Women had a greater prevalence of supplement use (40.0%) than men (26.6%) and were 1.84 times likely than men to take supplements (OR=1.84, 95% CI=1.32-2.55; p=0.0008). People with perceived adequate financial resources had a higher prevalence of supplement use (36.2%) than those with perceived inadequate financial resources (25.6%) and were 1.65 times likely to take supplements than their counterpart (OR=1.65, 95% CI=1.20-2.28; $p<0.05$). People with poor self-rated health had the highest prevalence of supplement use (39.8%) and were 1.56 times likely to take supplements than their counterpart (OR=1.56, 95% CI=1.20-2.02; $p<0.05$). Geographical region, marital status, education level, employment status and individual monthly income did not demonstrate any statistically significant associations with taking supplements. However, the prevalence of taking supplements was higher in the first northern stratum (39.6%) and the southern stratum (37.9%) compared to the central stratum (28.2%), eastern stratum (21.7%) and second northern stratum (21.4%). Supplement use also increased as education level increased. Supplement use was the highest at 41.4% in those with postgraduate education.

Demographic characteristics and number of supplements taken

Descriptive statistics were carried out to determine the relationships between demographic characteristics and the use of one or more supplements. Distribution of the number of supplements taken is shown in Figure 1. Men were more likely to take only one supplement (70.4%) than women (48.2%). The majority of men took only one supplement (70.4%). In contrast, women were more likely to take two to four supplements when compared to men. The majority of women took two or more supplements (51.8%). Women were 2.55 times likely than men to take two or more supplements (OR=2.55, 95% CI=1.43-4.57; $p<0.05$). The number of supplements taken did not significantly differ according to geographical region, marital status, education level, employment status, individual monthly income, perceived financial adequacy or self-rated health. However, the prevalence of taking two or more supplements was greater than 50% in those with post-graduate education (59.4%), the unemployed (63.2%), those with no monthly income (50.8%) and those with good self-rated health (52.8%). In all other demographic groups, the majority of persons took only one supplement.

The top ten supplements taken by adults in NAHSIT 2005-2008 compared to NAHSIT 1993-1996

Table 2 shows comparison of the top ten supplements taken by Taiwanese adults aged 19-44 years in NAHSIT 2005-2008 and NAHSIT 1993-1996. The top ten supplements taken by adults in 2005-2008 were: multivitamins and minerals (35.8%), vitamin B group (20.6%), calcium (9.0%), vitamin C (8.3%), glucosamine or chondroitin (6.7%), fish oil (6.7%), vitamin E (5.2%), grape seed (4.1%), Chinese medicines (4.0%), and algal products (3.9%). The greatest differences by gender in the ten most common supplements taken were that men were more likely to take multivitamins and minerals, vitamin B group, protein, liver health supplements, chicken essence and amino acids and women were more likely to take calcium, vitamin C, glucosamine or chondroitin, fish oil, vitamin E, grape seed and Si-Wu.

Comparing supplement use between NAHSIT 1993-1996 and the present survey, we found that the most common supplement taken in both surveys was multivitamins and minerals. However, the use of multivitamins and minerals has increased from 23.2% in 1993-1996 to 35.8% in 2005-2008. The same results were found for

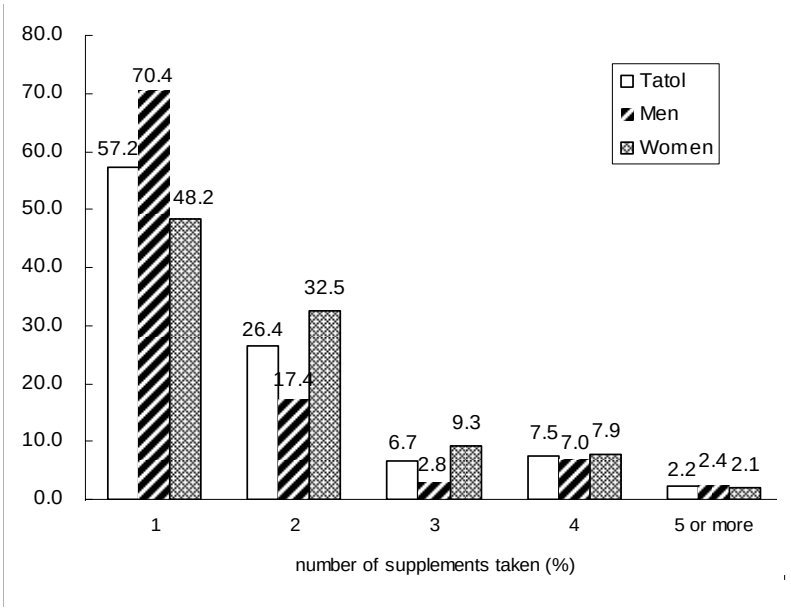

Figure 1. Distribution of the number of supplements taken by Taiwanese adults aged 19-44 years.

Table 2. Comparison of the top ten supplements taken by Taiwanese adults aged 19-44 years in NAHSIT 2005-2008 and NAHSIT 1993-1996

Rank	Total persons (%)		Men (%)		Women (%)	
	2005-2008	1993-1996	2005-2008	1993-1996	2005-2008	1993-1996
1	Multivitamins and minerals (35.8)	Multivitamins and minerals (23.2)	Multivitamins and minerals (42.3)	Multivitamins and minerals (23.6)	Multivitamins and minerals (31.4)	Vitamin E (24.2)
2	Vitamin B group (20.6)	Vitamin C (20.1)	Vitamin B group (22.1)	Vitamin C (14.2)	Vitamin B group (19.5)	Vitamin C (23.9)
3	Calcium (9.0)	Vitamin E (17.2)	Fish oil (6.3)	Energy drinks (9.7)	Calcium (13.2)	Multivitamins and minerals (22.9)
4	Vitamin C (8.3)	Si-wu (8.9)	Glucosamine / chondroitin (6.1)	Angelica sinensis (8.6)	Vitamin C (12.2)	Si-wu (13.7)
5	Glucosamine/ chondroitin (6.7)	Calcium (6.5)	Protein (5.3)	Lycium chinensis (7.3)	Glucosamine/ chondroitin (7.2)	Calcium (10.1)
6	Fish oil (6.7)	Angelica sinensis (6.3)	Liver health supplements (5.0)	Vitamin E (6.4)	Fish oil (6.9)	Vitamin B group (5.2)
7	Vitamin E (5.2)	Vitamin B group (5.3)	Chicken essence (4.2)	Calcium (5.9)	Vitamin E (6.8)	Angelica sinensis (4.8)
8	Grape seed (4.1)	Lycium chinensis (5.1)	Amino acids (3.4)	Vitamin B group (5.5)	Grape seed (6.1)	Ganoderma lucidum (3.8)
9	Chinese medicines (4.0)	Energy drinks (4.8)	Calcium (3.0)	Ganoderma lucidum (4.6)	Chinese medicines (5.3)	Lycium chinensis (3.7)
10	Algae products (3.9)	Ganoderma lucidum (4.2)	Vitamin E (2.9)	Chicken essence (2.6)	Si-wu (5.1)	Lecithin (2.6)

both men and women. In men, the prevalence of taking multivitamins and minerals increased from 23.6% in 1993-1996 to 42.3% in 2005-2008. In women, the prevalence of taking multivitamins and minerals increased from 24.2% in 1993-1996 to 31.4% in 2005-2008.

When the types of supplements taken were compared between NAHSIT 2005-2008 and 1993-1996, the greatest observed differences were that use of multivitamins and minerals, vitamin B group, calcium, glucosamine/ chrondroitin, fish oil, grape seed, Chinese medicines and algal products were higher in 2005-2008 compared to 1993-1996. In contrast, use of vitamin C, vitamin E, Si-Wu, Angelica sinensis, Lycium chinensis, energy drinks and Ganoderma lucidum were lower in 2005-2008. Supplements that moved into the top ten in 2005-2008 include vitamin B group, glucosamine/chondroitin, fish oil, grape seed, Chinese medicines and algal products. Supplements that were in the top ten in both surveys include multivitamins and minerals, calcium, and vitamins C and E.

When analyzed by gender, the greatest differences in the types of supplements taken in the two surveys were that in 2005-2008 men were more likely to take multivitamins and minerals, vitamin B group, fish oil, glucosamine/chondroitin, protein, liver health supplements, chicken essence, amino acids and vitamin E. Supplements that moved into the top ten list of supplements taken by men in the recent survey include fish oil, glucosamine/ chondroitin, protein, liver health supplements and amino acids. Supplements that were in the top ten in both surveys include multivitamins and minerals, vitamin B group, chicken essence, calcium and vitamin E.

In women, the greatest differences in the types of supplements taken between the two surveys were that use of multivitamins and minerals, vitamin B group, calcium, glucosamine/chondroitin, fish oil, grape seed and Chinese medicines were all higher in NAHSIT 2005-2008 compared to NAHSIT 1993-1996. Supplements that moved into the top ten in the most recent survey include glucosamine/chondroitin, fish oil, grape seed and Chinese medicines. Supplements that were in the top ten in both surveys include multivitamins and minerals, vitamin B group, calcium, vitamin C, vitamin E and Si-Wu.

Multivitamins and minerals, vitamin B group, vitamin C, Chinese medicines, and glucosamine/chondroitin (33.4, 12.7, 5.4, 5.3, 3.9%) are the top five supplements taken by those who took just one supplement. For those who take two or more supplements, the top five supplements are multivitamins and minerals, vitamin B group, calcium, fish oil, and vitamin C (39.1, 31.1, 16.6, 13.7, 12.2%).

Nutrient intakes from supplements

We investigated intake of nutrients with DRIs from supplements : calories, protein, calcium, phosphorus, magnesium, iodine, iron, selenium, vitamins A, C, D, E, B-1, B-2, B-6, B-12, niacin, folic acid, pantothenic acid, biotin, choline and zinc. We estimated the mean intake of nutrients from supplements, as well as the range, median, and the first and the third quartiles of intake, as shown in Table 3.

Mean intakes of vitamins A, C, D, E, B-1, B-1, B-6, B-12, pantothenic acid, and biotin were all above recommended levels. Intake of nutrients in the first quartile did not exceed recommended levels for any nutrients. Median intakes of vitamins A, D, E, B-1, B-1, B-6, B-12 and pantothenic acid exceeded recommended levels. In addition, third quartile intakes of iodine, iron and niacin exceeded recommended levels.

In men, mean intakes of iron, vitamins A, D, E, B-1, B-1, B-6, B-12, pantothenic acid and biotin all exceeded recommended levels. Intake of nutrients in the first quartile did not exceed recommended levels for any nutrients. Median intakes of iodine, iron, vitamins A, D, E, B-1, B-1, B-6, B-12 and pantothenic acid exceeded recommended levels. Third quartile intakes of niacin were also above recommended levels in men.

Table 3. Intake of nutrients from supplements in Taiwanese adults aged 19-44 years

Nutrient	Recommended intake†	n	Mean	Range	Q25	Median	Q75
Energy (Kcal)	1550-2850	170	21.4	0.1-414	1.5	5	14.4
Protein (g)	48-60	108	2.6	0.001-41.1	0.9	0.2	1.7
Calcium (mg)	1000	172	243.0	0.007-4350	47.1	115.7	225
Phosphorus (mg)	800	87	106.1	0.1-1125	28.3	89.3	125
Magnesium (mg)	315-360	133	83.2	0.4-479.7	16.9	71.4	100
Iodine (μg)	140	94	102.9	5.0-525	32.1	107.1	150*
Iron (mg)	10-15	113	11.0	0.1-74	2.6	7.71	18*
Selenium (μg)	50	101	25.7	0.9-120	8.6	25	25
Vitamin A(μgRE)	500-600	132	1061.6*	10.4-4800	360.4	864.0*	1501.5*
Vitamin C (mg)	100	154	140.3*	0.5-1700	33.3	60	150*
Vitamin D (μg)	5	87	7.1*	0.3-42.5	2.5	10*	10*
Vitamin E (mgα-TE)	12	165	46.4*	0.0003-603	6.4	19.5*	30.6*
Vitamin B1 (mg)	0.8-1.4	160	5.0*	0.004-100	0.5	1.5*	2*
Vitamin B2 (mg)	0.9-1.6	160	4.3*	0.003-100	0.7	1.7*	2.1*
Vitamin B6 (mg)	1.5	160	4.0*	0.001-100	0.7	2*	2.5*
Vitamin B12 (μg)	2.4	155	7.3*	0.03-150	2.0	4.3*	6*
Niacin (mgNE)	10-18	145	17.6	0.3-102.9	6.6	14.3	20*
Folate (μg)	400	151	217.7	0.1-1100	71.4	150	400
Pantothenic acid (mg)	5	142	9.1*	0.008-117.6	2.9	5.7*	10*
Biotin (μg)	30	117	44.5*	0.1-375	10.0	30	30
Choline (mg)	360-450	20	38.5	1.2-250	3.6	16.5	60
Zinc (mg)	12-15	139	9.0	0.003-30	2.7	7.5	15

†Taiwanese Dietary Reference Intakes (DRIs)
*Mean intake exceeds recommended DRIs

In women, mean intakes of vitamins A, C, D, E, B B-1, B-1, B-6, B-12, niacin, pantothenic acid and biotin were above recommended levels. Intake of nutrients in the first quartile did not exceed recommended levels. Median intakes of vitamins A, D, E, B-1, and B-12 were above recommended levels. Intakes of iodine, iron, vitamins C, B-2, B-6, niacin, pantothenic acid and biotin in the third quartile were also above recommended levels.

In summary, in men and women, intakes of vitamins A, D, E, B-1, B-1, B-6, B-12, pantothenic acid and biotin were all above DRIs. Men were more likely to have excessive intakes of iron compared to women. Women were more likely than men to have excessive intakes of vitamin C and niacin.

DISCUSSION

We found that 33.2% of adults aged 19-44 years in Taiwan reported taking supplements, which is lower than that of 52.0% observed in the National Health and Nutrition Examination Survey 1999-2000 in the United States (NHANES 1999-2000). In this study, 26.6% of men and 40.0% of women reported taking supplements. Greater use of supplements in women compared to men was also found in NAHSIT 1993-1996 [16] (20.4% of men and 33.0% of women took supplements) and NHANES 1999-2000 [8] (46.9% of men and 56.7% of women took supplements). There has been an increasing trend in both genders in supplement use over the 12 year period between NAHSIT 1993-1996 and the current survey. We found no relationship between geographical region, education level, individual monthly income and supplements use. This finding is in contrast to that of NAHSIT 1993-1996,[16] Kao et al.[13] and Chen et al.[11] that reported higher rates of supplement use in those living in more urbanized areas and with higher education and individual monthly income for 90's. International research by Radimer [8] and Archer [12] also found that a higher education level was associated with greater use of supplements. In men, the prevalence of taking supplements was highest in those who were students (33.7%). This is higher than the20.4% as suggested by in NAHSIT 1993-1996.[16] No statistically significant relationships between demographic characteristics and supplements use were observed by gender apart from the association between geographical region and supplement use in women, and the associations of current employment status and self-rated health with supplement use in men. These findings differ from those of NAHSIT 1993-1996,[16] which showed that living in a more urbanized environment and a higher education level were associated with taking supplements in both men and women. We found that people with perceived inadequate financial resources were significantly less likely to take supplements (25.6%) than those with perceived adequate financial resources (36.2%). This finding agrees with that of Chen et al.[11] In addition, people with poor self-rated health were more likely to take supplements (39.8%) than those with average self-rated health (29.8%). This finding differs from the results of NHANES 1999-2000 [8] where those with extremely good or very good self-rated health were more likely to take supplements than those with average or poor self-rated health.

We found that as the number of supplements taken increased, the number of people who use supplement decreased, which is similar to the findings of NAHSIT 1993-1996 and NHANES 1999-2000.[5,8,16] We found that men were more likely to take only one supplement than

women, which is similar to the findings observed in NAHSIT 1993-1996 (50.9% men vs 44.6% women took only one supplement). Geographical region, marital status, education level, employment status, individual monthly income, perceived financial adequacy and self-rated health were not significantly associated with taking one or more supplements. These findings differs from that of Chen et al.[18] where the use of more than one supplement was higher in women and those with higher education in 1993-1996.

Our study found that multivitamins and minerals was the most common type of supplement taken, followed by vitamin B group, calcium, vitamin C, glucosamine/ chondroitin, fish oil, vitamin E, grape seed, Chinese medicines and algal products. When compared to NAHSIT 1993-1996,[11] there was a clear increasing trend in the prevalence of use in both sexes. NAHSIT 1993-1996,[11] other local and international research [8-11] also found that multivitamins and minerals are the most common supplements taken. When comparing the top ten supplements in the current survey to those in NAHSIT 1993-1996, we found that multivitamins and minerals, vitamin B group, calcium, vitamin C and vitamin E were in the top ten in both surveys. However, glucosamine/chondroitin, fish oil, grape seed, Chinese medicines and algal products were new additions to the top ten items in the 2005-2008 survey. This indicates that there has been a great deal of change in the supplements taken by Taiwanese people over the past ten years. Therefore, it is important that government policies and information provided about supplements are appropriately modified in response to these changes in the supplement market. When the top ten supplements were compared by gender, we found that men were more likely than women to take protein, liver health supplements, chicken essence and amino acids. On the other hand, women were more likely than men to take vitamin C, grape seed, Chinese medicines and Si-Wu. The reasons behind these differences in supplement use by men and women, is an important topic of future research.

In a study in the United States by Archer,[12] out of a sample of approximately 2000 persons, few individuals had intakes of folate, vitamin E, magnesium, zinc, selenium, calcium, niacin and vitamin C that exceeded the upper limits (UL) of recommended intakes. Although we found that nutrient intakes from supplements did not exceed the UL, intakes of vitamins A, C, D, E, B-1, B-1, B-6, B-12, pantothenic acid and biotin all exceeded DRIs. In NAHSIT 1993-1996 a 24 hour dietary recall method [19] was used to estimate the dietary intake of nutrients and found that intakes of vitamin E and calcium from dietary sources did not meet mean recommended intakes in men and women aged 20-54. In addition, dietary intakes of iron in women aged 20-54 and dietary intakes of vitamins B_1 and B_2 and niacin in women aged 20-24 did not meet mean recommended intakes. If intakes from supplements are combined with dietary intakes, the total intake could reach recommended levels or could run the risk of being excessive. When experts carry out nutrient estimations, they should consider the nutrients contained in supplements as well as dietary sources in order to avoid underestimating intake. It is important to emphasize the risks associated with excessive intake of nutrients from supplements when carrying out nutritional education.

The appropriate use of supplements can help to reduce nutritional deficiencies. However, excessive use of supplements can result in harmful effects on health. This study found an increasing trend of supplement use in adults aged 19-44 years in Taiwan. In addition, the intake of some nutrients from supplements alone exceeded recommended levels. Whether the combined intake of nutrients from supplements and dietary sources results in excessive intake of particular nutrients requires further confirmation. Regulations for the management of supplements that define and provide standards for supplements should be established and appropriate management strategies should be actively carried out. It is important to educate the public about the correct use of supplements and to improve understanding of the characteristics, ingredients and nutrient content of supplements. Our study used data from a national survey that was weighted to provide nationally representative estimates. Our findings can be used in the development or modification of supplement management strategies and in promoting education aimed at facilitating the safe and healthy use of supplements in Taiwan.

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AUTHOR DISCLOSURES

Jia-Rong Lin, Yi-Shin Lin, Mei-Ding Kao, Yi-Hsin Yang, Wen-Harn Pan, no conflicts of interest.

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Original Article

Use of supplements by Taiwanese adults aged 19-44 during 2005-2008

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臺灣 19-44 歲成年人膳食補充品使用概況

本研究目的在於了解臺灣 19-44 歲成年人膳食補充品使用狀況。本文依據「2005-2008 國民營養健康狀況變遷調查」之資料庫，針對臺灣 19-44 歲成人膳食補充品使用狀況進行分析。總計樣本數為 973 位(男性 485 位，女性 488 位)。取樣所得數據皆經「問卷權數」加權處理以代表全國概況。結果顯示 19-44 歲成人平均補充品使用率為 33.2%(男性為 26.6%、女性為 40.0%)。選擇補充品數量只受性別之影響，男性主要以使用單種補充品為主，女性則以使用多種補充品為主，女性使用多種補充品為男性的 2.6 倍。19-44 歲成年人補充品使用種類以綜合維他命與礦物質(35.8%)最多，其次為維生素 B 群(20.6%)與鈣(9.3%)。審視 19-44 歲成人補充品營養素攝取量，發現男、女性超過臺灣膳食營養素每日建議量(DRIs)的共同營養素有：維生素 A、D、E、B_1、B_2、B_6、B_{12}、泛酸及生物素；另外男性鐵攝取量超過建議量，女性則攝取過多的維生素 C 與菸鹼素。研究結果可供政府機構制定膳食補充品相關政策之參考。

關鍵字：膳食補充品、19-44 歲成年人、性別、綜合維他命與礦物質、補充品營養素攝取量