

Food Habits, Nutritional Knowledge, Nutritional Risk Factors and Health-Related Lifestyle of Korean Outpatients Aged Over 50 Years Taking Supplements*

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ABSTRACT

The purpose of this study was to investigate food habits, nutritional knowledge, nutritional risk factors, health-related lifestyle, health status and dietetic therapy in Korean middle-aged and elderly outpatients taking supplements. A cross-sectional survey was conducted from July to December in 2001. Subjects were 1702 (male 731, female 971) age-related chronic disease outpatients aged over 50 years. Data was collected using a standardized questionnaire by in-person interview and analyzed by SPSS system. The subjects with supplement had significantly lower nutritional knowledge, higher nutritional risk factors, undesirable lifestyle, and lower self-reported health status compared to those without supplement. However, the subjects with supplement had desirable food habits and more concern about health compared to those without supplement. Age-related chronic disease group with supplement had significantly undesirable food habits, lower nutritional knowledge and higher nutritional risk factors compared to control group with supplement. Age-related chronic disease group without supplement had significantly desirable food habits, higher nutritional knowledge, lower self-reported health status and higher stress compared to control group without supplement. Therefore, these results may provide basic information for proper supplement of Korean middle-aged and elderly outpatients. (*J Community Nutrition* 4(2) : 109~117, 2002)

KEY WORDS : the middle-aged · elderly · supplement use · food habits nutritional risk factors · nutritional knowledge.

Introduction

Dietary supplements are defined in the Dietary Supplement Health and Education Act (DSHEA) of America as products intended to supplement the diet to enhance health that include vitamins, minerals, amino acids, herbs, and other botanicals, etc. (Public Law 1994). In Korea, there are several categories of supplements : foods for special dietary uses, herb and Chinese medicine, vitamin-mineral supplement, dietary supplements, and traditional health foods, etc. (Kim et al. 2001 ; Food code, Korean food & drug administration 1999).

Most of the elderly have age-related chronic disease ; diabetes, hypertension, heart disease and cancer, arthritis, etc (Chang, Kim 2001 ; Kim, Yoon 1989 ; Yoo 1997). Also the elderly have risks of developing nutrient deficiency as a result of inappropriate food intake, drug use, age-related disease, social isolation, poverty and changes of absorption in body, etc. (Tripp 1997).

As socioeconomic status and mass production were increasing, supplements were more easily available ; about 30–94.2% of the elderly were shown to, use non-prescribed supplements (Balluz et al. 2000 ; Chang, Kim 2001 ; Kim et al. 2001 ; Messerer et al. 2001 ; Song, Oh 2000). It has been reported that dietary supplement use is associated with demographic and health-related characteristics such as increased age, female, level of education, income level, healthful lifestyle, nutritional knowledge, concern about health, nutritional risk factors and adverse health conditions such as disease (Chang, Kim 2001 ; Greger 2001 ; Kim et al. 2001 ; Lyle et al 1998 ; Messerer et al. 2001). Especially, in elderly

*This study was supported by a grant of the Korea Health 21 R & D Project, Ministry of Health and Welfare, Republic of Korea (HMP-00-CH-17-0016).

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outpatient of age-related chronic disease, supplement use rate was higher compared to that of the non-institutional elderly population (Marriott 2000 ; Neuhouser et al. 1999 ; Newman et al. 1998 ; Rock et al. 1997).

Therefore, the purpose of this study was to investigate the prevalence of supplements use and its association with health-related and dietary characteristics in Korean age-related disease outpatients aged over 50 years. Food habits, nutritional knowledge, nutritional risk factors, health-related lifestyle and health status of age-related chronic disease group were compared with control group, with or without supplement, to provide basic information for proper supplement use of age-related chronic disease outpatients.

Materials and Methods

1. Subjects

A case-control study was conducted and the subjects were 1,702 age-related chronic diseases outpatients aged over 50 years (diagnosed diabetes, hypertension and cancer, etc.). Each of the subjects, with or without supplement, were divided into a case group (age-related chronic disease) and control group.

2. Data collection

Information about supplement use, age-related chronic

disease, food habits, such as frequency of snacks, and constant meal time, nutritional knowledge, nutritional risk factors, such as dizziness, was collected by in-person interviews using a standardized questionnaire. Health-related characteristics included health-related lifestyle, smoking habits, drinking of alcohol, exercise, health status and dietetic therapy. Subjects were asked their use of supplements for at least a month in the past year.

3. Statistical analysis

The statistical analysis was conducted using SPSS 10.0 program. Frequency counts (%), mean, and standard deviation were calculated for all variables. Student's t-test and Chi-square test were used to determine statistical significance.

Results

1. Prevalence of age-related chronic disease

The rate of age-related chronic disease was 80% in male subjects and 89.5% in female subjects. This result was lower than the rate of age-related chronic disease in elderly of Jeonbuk area (Chang, Kim 2001). However, 1998 National Health and Nutritional Survey reported that the rate of age-related chronic disease was 53.9% in male subjects and 57.9% in female subjects, which was lower than this result (Ministry of Health and Welfare 1999a). Table 1 presents rate

Table 1. Prevalence of age-related chronic disease

Disease	Male	Female	Total	Significance
Diabetes	125(14.8) ¹⁾	229(14.9)	354(14.9)	p = 0.000 ^{***2)}
Hypertension	176(20.8)	427(27.8)	603(25.3)	
Paralysis	6(0.8)	12(0.8)	18(0.7)	
Heart disease	26(3.1)	43(2.8)	69(2.9)	
Arthritis	28(3.3)	205(13.3)	233(9.8)	
Osteoporosis	2(0.2)	104(6.8)	106(4.5)	
Hepatitis	47(5.6)	34(2.2)	81(3.4)	
Nephritis	11(1.3)	11(0.7)	22(0.9)	
Stomach disease	56(6.6)	89(5.8)	145(6.1)	
Liver cancer	37(4.5)	17(1.1)	54(2.3)	
Breast cancer	0(0.0)	4(0.3)	5(0.2)	
Colon cancer	50(5.9)	61(3.9)	111(4.7)	
Stomach cancer	152(17.9)	71(4.6)	223(9.4)	
Lung cancer	1(0.1)	0(0.0)	1(0.0)	
Uterine cancer	0(0.0)	26(1.7)	26(1.1)	
Ovarian cancer	0(0.0)	10(0.6)	10(0.4)	
Others	128(15.1)	195(12.7)	323(13.6)	
Total	846(100.0)	1538(100.0)	2384(100.0)	

1) N(%)

2)* : p < 0.05, ** : p < 0.01, *** : p < 0.001 by χ^2 -test

of age-related chronic disease in order. Male subjects have hypertension (20.8%), stomach cancer (17.9%) and diabetes (14.8%), and female subjects have hypertension (27.8%), diabetes (14.9%) and arthritis (13.3%). In a previous study, elderly in the Chunchon area have arthritis (44.7%), hypertension (18.8%) and diabetes (10.5%), etc. (Lee et al. 2001).

2. The rate of supplement usage

Table 2 presents the supplement use by gender and age-related chronic disease. Total rate of supplement use was 48.9% (male 48.4%, female 46.6%). The rate of supplement use in male subjects was significantly higher than that of female subjects (p<0.01).

Mean kinds of dietary supplement taken by subjects was 1.7 (male 1.8, female 1.6). The rate of supplement use in male subjects was significantly higher than that of female subjects (p<0.001).

3. Food habits

Food habits of age-related chronic disease and control groups with or without supplements are presented in Table 3. The subjects with supplement showed significantly higher frequency of snacks, frequency of eating out and fat trimming from meat compared to those without supplements. Control group with supplements showed significantly higher frequency of eating out compared to age-related chronic disease group with supplements. In supplement user, there was a significant difference in fat trimming from meat between age-related chronic disease and control groups. The control group without supplements had significantly higher frequency of snacks, regular meal size and constant meal time compared to the age-related chronic disease group without supplement. Kim's study (1994) reported no correlation between food habits and supplement usage in middle-aged. However, in

other previous studies of elderly, elderly with desirable food habits showed higher rate of supplement use (Chang, Kim 2001 ; Kim et al. 2001).

4. Nutritional knowledge

Nutritional knowledge of age-related chronic disease and control groups with or without supplement is presented in Table 4. The subjects with supplement showed significantly higher rate of correct answers compared to those without supplement in questions "Nutrition value of beef is better than that of pork or chicken" and "The older you get, the less meat or fish you should eat". There was a significant difference in the rate of correct answers between control and age-related chronic disease groups with supplements in question "The getting older you are, the less water you should drink" control group with supplement showed a significantly higher rate of correct answers compared to the age-related chronic disease group with supplements. Supplement non-users showed higher nutritional knowledge compared to supplement users. Subjects with higher nutritional knowledge showed a significantly higher rate of supplement than subjects with lower nutritional knowledge. These results were similar to the previous results of Kim's study (1994). In contrast, it has been reported that the person with high nutritional knowledge used much more supplements (Kim et al. 1992 ; Kim et al. 2001).

5. Nutritional risk factors

Nutritional risk factors of age-related chronic disease and control groups with or without supplement are presented in Table 5. The subjects with supplement showed significantly higher nutritional risk factors of unhappy meal times, difficulty in food intake due to dental problems, lack of appetite, digestion disorder, vomiting, experience of gastric-intestinal surgery, fluctuation of body weight, dizziness and reduction of food intake compared to that of those without supplement. Age-related chronic disease group with supplement showed significantly higher nutritional risk factors of constipation or diarrhea, experience of gastric-intestinal surgery and dizziness and reduction of food intake compared to that of control group with supplement. There was no significant difference in nutritional risk factors between age-related chronic disease and control groups without supplements.

6. Health-related lifestyle

Health-related lifestyle of age-related chronic disease and control groups with or without supplement is presented in

Table 2. Supplement use of subjects

	Male (N = 536)		Female (N = 610)	
	User (N = 271)	Non-user (N = 265)	User (N = 284)	Non-user (N = 326)
Use rate	271 (48.4) ¹⁾	265 (51.6)	284 (46.6)	326 (53.4)
Significance	p < 0.05 ^{*2)}		p < 0.01 ^{**}	
	Male (N = 271)		Female (N = 284)	
Kinds	1.8 ± 1.1 ³⁾		1.6 ± 0.8	
Significance	p < 0.001 ^{***4)}			

1) N (%)

2) *** : p < 0.001 by χ^2 -test

3) Mean ± SD

4) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 by Student's t-test

Table 3. Food habits of the subjects with or without supplement

Variables	User(N = 602)		Non-user(N = 1100)		Total(N = 1702)	
	Case	Control	Case	Control	User	Non-user
Frequency of snack						
3 times/day <	28(5.3) ¹⁾	0(0.0)	35(3.8)	11(16.2)	28(5.0)	46(4.6)
1-2 times/day	226(43.0)	15(42.9)	356(38.6)	20(29.4)	241(43.0)	376(37.9)
> 1 times/day	139(26.4)	10(28.6)	239(23.5)	22(32.4)	149(26.6)	261(26.3)
None	133(25.3)	10(28.6)	293(31.7)	15(22.1)	143(25.5)	308(31.1)
Significance	p = 0.560 ^{NS,2)}		p < 0.001 ^{***3)}		p < 0.05*	
Regularity of meal time						
Always	175(33.2)	12(34.3)	271(29.3)	28(41.2)	187(33.3)	299(31.4)
Often	200(38.0)	11(31.4)	350(37.8)	20(29.4)	211(37.5)	370(38.8)
Moderate	25(4.7)	2(5.7)	56(6.1)	9(13.2)	27(4.8)	65(6.8)
A little	108(20.5)	8(22.9)	210(22.7)	9(13.2)	116(20.6)	219(23.0)
Not at all	19(3.6)	2(5.7)	38(4.1)	2(2.9)	21(3.7)	40(4.2)
Significance	p = 0.921 ^{NS}		p < 0.05*		p = 0.465 ^{NS}	
Frequency of eating out						
1 times/day <	86(16.3)	10(28.6)	115(12.5)	10(14.9)	96(14.4)	125(19.0)
1 times/week <	98(18.6)	4(11.4)	194(21.0)	6(9.0)	102(15.3)	200(30.3)
1 times/month	121(23.0)	14(40.0)	193(20.9)	18(26.9)	135(20.2)	211(31.9)
None	227(42.1)	7(20.0)	421(45.6)	33(3.3)	334(50.1)	454(68.7)
Significance	p < 0.01 ^{**}		p = 0.111 ^{NS}		p < 0.01 ^{**}	
Fat trimming from meat						
Remaining	165(31.4)	9(25.7)	291(31.5)	26(38.2)	174(31.0)	317(31.9)
Roughly elimination	69(13.1)	9(25.7)	183(19.8)	8(11.8)	78(13.9)	191(19.2)
Almost elimination	223(42.4)	17(48.6)	258(27.9)	20(29.4)	240(42.8)	278(28.0)
Vegetarian	69(13.1)	0(0.0)	193(20.9)	14(20.6)	69(12.3)	207(20.8)
Significance	p < 0.05*		p = 0.379 ^{NS}		p < 0.001 ^{***}	
Regular meal size						
Always	215(41.0)	18(51.4)	363(39.3)	40(58.8)	233(41.6)	403(40.4)
Often	223(42.5)	12(34.3)	390(42.3)	21(30.9)	235(42.0)	411(40.6)
Moderate	21(4.0)	1(2.9)	48(5.2)	0(0.0)	22(3.9)	48(4.7)
A little	55(10.5)	2(5.7)	48(5.2)	6(8.8)	57(10.2)	54(5.3)
Not at all	11(2.1)	2(5.7)	95(10.3)	1(1.5)	13(2.3)	96(9.5)
Significance	p = 0.395 ^{NS}		p < 0.05*		p = 0.680 ^{NS}	
Slow eating						
Always	91(17.3)	5(14.3)	151(16.4)	11(16.2)	96(17.1)	162(16.3)
Often	67(12.8)	8(22.9)	118(12.8)	11(16.2)	75(13.4)	129(13.0)
Moderate	104(19.8)	7(20.0)	166(18.0)	11(16.2)	111(19.8)	177(17.9)
A little	172(32.8)	9(25.7)	358(38.8)	23(33.8)	181(32.3)	381(38.4)
Not at all	91(17.3)	6(17.1)	130(14.1)	12(17.6)	97(17.3)	142(14.3)
Significance	p = 0.528 ^{NS}		p = 0.801 ^{NS}		p = 0.112 ^{NS}	

1) N(%)

2) N.S. : Not significant by χ^2 -test3) * : p<0.05, ** : p<0.01, *** : p<0.001 by χ^2 -test

Table 6. Ex-smoking period of the subjects with supplement was significantly longer compared to those without supplement use (p<0.001). Amount of alcohol drinking and number of ex-smoking cigarettes of subjects with supplement were

significantly greater than those without supplements (p<0.01 and p<0.001, respectively). There was no significant difference in smoking and drinking period, and exercise between supplement users and non-users. The control group with sup-

Table 4. Nutritional knowledge of the subjects with or without supplement

Question items	User (N = 602)		Non-user (N = 1100)		Total (N = 1702)	
	Case	Control	Case	Control	User	Non-user
If you have a big lunch or supper in spite of skipping breakfast, it would cause no problem.						
Correct	72 (15.1) ¹⁾	5 (17.9)	76 (10.7)	4 (11.8)	79 (15.6)	80 (10.8)
Wrong	364 (76.1)	23 (82.1)	592 (83.7)	29 (85.3)	387 (76.2)	621 (83.8)
Don't know	42 (8.8)	0 (0.0)	39 (5.5)	1 (2.9)	42 (8.3)	40 (5.4)
Significance	p = 0.257 ^{N.S.2)}		p = 0.803 ^{N.S.}		p < 0.001 ^{***3)}	
Taking vitamin or supplement would help you get healthy.						
Wrong	50 (10.5)	5 (17.9)	64 (8.9)	2 (5.9)	114 (20.2)	66 (8.9)
Correct	364 (76.2)	22 (78.6)	574 (81.2)	30 (88.2)	386 (68.3)	604 (81.5)
Don't know	64 (13.4)	1 (3.6)	69 (9.9)	2 (5.9)	65 (11.5)	71 (9.6)
Significance	p = 0.189 ^{N.S.}		p < 0.01 ^{**}		p = 0.098 ^{N.S.}	
Egg yolk has enough cholesterol.						
Correct	352 (73.6)	22 (78.6)	550 (77.8)	25 (73.5)	374 (73.9)	575 (77.6)
Wrong	16 (3.3)	2 (7.1)	21 (3.0)	1 (2.9)	18 (3.6)	22 (3.0)
Don't know	110 (23.0)	4 (14.3)	136 (19.2)	8 (23.5)	114 (22.5)	144 (19.4)
Significance	p = 0.358 ^{N.S.}		p = 0.935 ^{N.S.}		p = 0.141 ^{N.S.}	
Milk has a nutrient to strengthen your bone.						
Correct	405 (84.7)	26 (92.9)	628 (88.9)	32 (94.1)	431 (85.1)	661 (89.1)
Wrong	13 (2.7)	2 (7.1)	20 (2.8)	0 (0.0)	15 (3.0)	20 (2.7)
Don't know	60 (12.6)	0 (0.0)	59 (8.3)	2 (5.9)	60 (11.9)	61 (8.2)
Significance	p = 0.065 ^{N.S.}		p = 0.716 ^{N.S.}		p = 0.083 ^{N.S.}	
Nutrition value of rice is better than that of barley.						
Wrong	110 (23.0)	5 (17.9)	133 (18.8)	6 (17.6)	115 (22.7)	139 (18.8)
Correct	272 (56.9)	14 (50.0)	402 (56.9)	21 (61.8)	286 (56.5)	423 (57.1)
Don't know	96 (20.1)	9 (32.1)	172 (24.3)	7 (20.6)	105 (20.8)	179 (24.2)
Significance	p = 0.303 ^{N.S.}		p = 0.368 ^{N.S.}		p = 0.507 ^{N.S.}	
Nutrition value of beef is better than that of pork or chicken.						
Wrong	177 (37.0)	8 (28.6)	231 (32.7)	9 (26.5)	185 (36.6)	240 (32.4)
Correct	162 (33.9)	8 (28.6)	208 (29.4)	15 (44.1)	170 (33.6)	223 (30.1)
Don't know	139 (29.1)	12 (42.9)	268 (37.9)	10 (29.4)	151 (29.8)	278 (31.5)
Significance	p = 0.298 ^{N.S.}		p = 0.338 ^{N.S.}		p < 0.05 [*]	
The older you are getting, the less water you should drink.						
Wrong	73 (15.3)	0 (0.0)	100 (14.1)	1 (2.9)	73 (14.4)	101 (13.6)
Correct	322 (67.4)	20 (71.4)	451 (63.8)	29 (85.3)	342 (67.6)	480 (64.8)
Don't know	83 (17.4)	8 (28.6)	156 (22.1)	4 (11.8)	91 (18.0)	160 (21.6)
Significance	p < 0.05 [*]		p = 0.075 ^{N.S.}		p = 0.281 ^{N.S.}	
The older you are getting, the less meat or fish you should eat.						
Wrong	164 (34.3)	7 (25.0)	218 (30.8)	7 (20.6)	171 (33.8)	225 (30.4)
Correct	216 (45.2)	10 (35.7)	272 (38.5)	20 (58.8)	226 (44.7)	292 (39.4)
Don't know	98 (25.5)	11 (39.8)	217 (30.7)	7 (20.6)	109 (21.5)	224 (30.2)
Significance	p = 0.063 ^{N.S.}		p = 0.130 ^{N.S.}		P < 0.05 [*]	

1) N(%)

2) N.S. : Not significant by χ^2 -test

3) * : p < 0.05, ** : p < 0.01, *** : p < 0.001 by χ^2 -test

plement had a significantly longer smoking period compared to that of the age-related chronic disease group with supplement (p<0.05). The age-related chronic disease group with supplement had longer ex-smoking, drinking and exercise periods compared to that of the control group with supplement, but there was no significant difference between case and control groups with supplement. The age-related chronic

disease group without supplement showed significantly longer ex-smoking periods and higher number of ex-smoking cigarettes compared to that of the control group without supplement. The age-related chronic disease group showed a tendency of more smoking in the past, but no smoking and more exercise at present compared to that of the control group. In previous studies, positive lifestyle factors were associated

Table 5. Nutritional risk factors of the subjects with or without supplement

Question items	User (N = 602)		Non-user (N = 1100)		Total (N = 1702)	
	Case	Control	Case	Control	Case	Control
Happy meal time						
Yes	371 (83.6) ¹⁾	24 (96.0)	570 (87.2)	27 (90.0)	395 (59.2)	597 (87.3)
No	73 (16.4)	1 (4.0)	84 (12.8)	3 (10.0)	74 (40.8)	87 (12.7)
Significance	p = 0.097 ^{NS2)}		p = 0.648 ^{NS}		p < 0.05 ³⁾	
Dentures						
Yes	130 (29.3)	6 (24.0)	134 (20.5)	3 (10.0)	135 (84.5)	137 (20.0)
No	6 (24.0)	19 (76.0)	520 (79.5)	27 (90.0)	25 (15.0)	547 (80.0)
Significance	p = 0.571 ^{NS}		p = 0.160 ^{NS}		p < 0.05*	
Lack of appetite						
Yes	127 (28.6)	3 (12.0)	120 (18.4)	2 (6.7)	130 (27.7)	122 (17.9)
No	317 (71.4)	22 (88.0)	533 (71.6)	28 (92.3)	340 (72.3)	561 (82.1)
Significance	p = 0.071 ^{NS}		p = 0.102 ^{NS}		p < 0.01***	
Digestion disorder						
Yes	133 (30.0)	3 (12.0)	144 (22.1)	10 (33.3)	136 (29.0)	154 (22.5)
No	311 (70.0)	22 (88.0)	509 (77.9)	20 (66.7)	333 (71.0)	529 (77.5)
Significance	p = 0.054 ^{NS}		p = 0.148 ^{NS}		p < 0.01**	
Constipation or diarrhea						
Yes	120 (27.3)	5 (20)	145 (22.2)	6 (20.0)	125 (26.7)	151 (22.1)
No	324 (73.0)	20 (80.0)	508 (77.8)	24 (88.0)	344 (73.3)	532 (77.9)
Significance	p < 0.05*		p = 0.942 ^{NS}		p = 0.41 ^{NS}	
Unbalanced diets						
Yes	130 (29.3)	4 (16.0)	140 (21.4)	8 (26.7)	134 (28.6)	148 (21.7)
No	314 (70.7)	21 (84.0)	513 (78.6)	22 (73.3)	335 (71.4)	537 (78.3)
Significance	p = 0.0153 ^{NS}		p = 0.767 ^{NS}		p < 0.01*	
Vomiting						
Yes	53 (11.9)	0 (0.0)	44 (6.7)	2 (6.7)	53 (11.3)	46 (6.7)
No	391 (88.1)	25 (100.0)	609 (93.3)	28 (93.3)	416 (92.5)	637 (93.3)
Significance	p = 0.067 ^{NS}		p = 0.997 ^{NS}		p < 0.01**	
Disease (aphtha, urticaria)						
Yes	44 (9.9)	1 (4.0)	44 (6.7)	2 (6.7)	45 (9.6)	46 (6.7)
No	400 (90.0)	24 (96.0)	609 (93.3)	28 (93.3)	424 (90.4)	637 (93.3)
Significance	p = 0.329 ^{NS}		p = 0.997 ^{NS}		p = 0.086 ^{NS}	
Gastric-intestinal surgery						
Yes	159 (35.8)	1 (4.0)	143 (34.3)	2 (6.7)	160 (34.1)	145 (21.2)
No	285 (64.2)	24 (96.0)	150 (78.1)	28 (93.3)	309 (65.9)	538 (78.8)
Significance	p < 0.01***		p = 0.136 ^{NS}		p < 0.01***	
Fluctuation of body weight						
Yes	131 (29.5)	2 (8.0)	107 (16.4)	4 (11.3)	135 (28.7)	111 (16.3)
No	313 (70.5)	23 (92.0)	546 (83.6)	26 (86.7)	335 (71.3)	572 (83.7)
Significance	p = 0.067 ^{NS}		p = 0.892 ^{NS}		p < 0.01***	
Dizziness						
Yes	118 (26.6)	2 (8.0)	125 (19.1)	4 (11.3)	120 (25.6)	129 (18.9)
No	326 (73.4)	23 (92.0)	528 (80.9)	26 (86.7)	349 (74.4)	554 (81.1)
Significance	p < 0.05*		p = 0.721 ^{NS}		p < 0.01**	
Reduction of food intake						
Yes	87 (19.6)	3 (12.0)	93 (14.2)	2 (6.7)	90 (19.2)	95 (13.9)
No	356 (80.4)	22 (88.0)	560 (85.8)	28 (93.3)	378 (80.8)	588 (86.1)
Significance	p < 0.01**		p = 0.500 ^{NS}		p < 0.01**	

1) N(%)

2) N.S. : Not significant by χ^2 -test3)* : p < 0.05, ** : p < 0.01, *** : p < 0.001 by χ^2 -test

Table 6. Health-related lifestyle of the subjects with or without supplement

Variables	User (N = 602)		Non-user (N = 1100)		Total (N = 1702)	
	Case	Control	Case	Control	Case	Control
Smoking period (y)	4.6 ± 12.6 ¹⁾	6.0 ± 12.5 ²⁾	4.5 ± 12.5	9.3 ± 17.7*	4.9 ± 12.4	4.7 ± 12.8
Smoking (cigarette/d)	2.1 ± 6.3	3.8 ± 8.5	2.1 ± 6.4	2.9 ± 0.1	2.2 ± 6.4	2.1 ± 6.4
Ex-smoking period (y)	7.2 ± 14.5	5.5 ± 12.7	4.3 ± 11.5	1.6 ± 6.6**	6.9 ± 12.3	4.1 ± 11.3***
Ex-smoking (cigarette/d)	4.7 ± 9.9	2.8 ± 6.6	2.6 ± 8.0	0.9 ± 3.8***	4.4 ± 9.7	2.5 ± 7.8***
Alcohol drinking (ml)	17.8 ± 40.8	18.2 ± 34.1	13.9 ± 35.4	20.1 ± 46.3	17.4 ± 40	14.1 ± 36.0*
Drinking period (y)	8.2 ± 15.9	6.7 ± 13.5	7.0 ± 14.8	9.8 ± 18.9	7.9 ± 15.6	7.0 ± 15.0
Exercise (frequency/w)	2.3 ± 3.0	1.9 ± 3.0	3.1 ± 17.3	2.4 ± 3.0	2.3 ± 3.0	3.1 ± 16.7
Exercise time (min)	0.6 ± 1.0	0.4 ± 0.8	0.6 ± 0.8	0.7 ± 1.2	0.6 ± 0.9	0.6 ± 0.9

1) Mean ± SD

2)* : p < 0.05, ** : p < 0.01, *** : p < 0.001 by Student's t-test

Table 7. Health status and dietetic therapy of the subjects with or without supplement

Variables	User (N = 602)		Non-user (N = 1100)		Total (N = 1702)	
	Case	Control	Case	Control	Case	Control
Self-reported health status						
Very poor	83(15.7) ¹⁾	2(5.7)	44(4.8)	1(1.5)	85(15.1)	45(4.5)
Poor	198(37.6)	11(31.4)	341(36.9)	18(26.5)	209(37.2)	359(36.1)
Average	131(24.9)	9(24.7)	290(31.4)	14(20.6)	140(24.9)	305(30.7)
Good	105(19.9)	12(34.3)	221(23.9)	34(50.0)	117(20.8)	255(25.7)
Very good	10(1.9)	1(2.9)	29(3.1)	1(1.5)	11(2.0)	30(3.0)
Significance	p = 0.204 ^{N.S.2)}		p < 0.001 ³⁾³⁾		p < 0.001 ³⁾	
Concern about health						
Always	203(38.5)	12(34.3)	267(28.9)	13(19.1)	215(38.3)	280(28.2)
Sometimes	176(33.4)	12(34.3)	389(42.1)	28(41.2)	188(31.0)	418(42.1)
Don't tend to concern	105(20.1)	8(22.9)	204(22.1)	20(29.4)	114(20.3)	224(22.6)
No concern	42(8.0)	3(0.5)	64(6.9)	7(10.3)	45(8.0)	71(7.2)
Significance	p = 0.960 ^{N.S.}		p = 0.198 ^{N.S.}		p < 0.001 ³⁾	
Stress						
Never	136(25.9)	9(1.6)	282(30.5)	35(51.5)	145(25.9)	317(31.9)
Little	207(39.4)	15(44.1)	347(37.6)	18(26.5)	222(39.7)	635(37.8)
Moderate	143(27.2)	9(26.5)	241(26.1)	14(20.6)	152(27.2)	256(25.8)
Much	39(7.4)	1(2.9)	54(5.8)	1(0.1)	40(7.2)	55(3.5)
Significance	p = 0.780 ^{N.S.}		p < 0.01 ^{**}		p = 0.074 ^{N.S.}	
Self-perceived melancholia						
Never	221(42.1)	11(32.4)	386(41.7)	24(35.3)	232(41.5)	410(41.2)
Seldom	107(20.4)	2(5.9)	157(17.0)	12(17.6)	109(19.5)	169(17.0)
Sometimes	175(33.3)	21(61.8)	320(34.6)	29(42.6)	196(35.1)	350(35.2)
Always	22(4.2)	0(0.0)	62(6.7)	3(0.3)	22(3.9)	35(4.2)
Significance	p < 0.005 ^{**}		p = 0.507 ^{N.S.}		p = 0.134 ^{N.S.}	
Dietetic therapy						
Yes	137(26.1)	0(0.0)	231(25.2)	0(0.0)	137(24.5)	231(23.9)
No	387(73.9)	35(100.0)	685(74.8)	64(100.0)	422(75.5)	750(76.5)
Significance	p < 0.001 ³⁾		p < 0.001 ³⁾		p = 0.671 ^{N.S.}	
Effect of diet therapy						
Yes	108(81.2)	0(0.0)	176(80.0)	0(0.0)	108(81.2)	176(80.0)
No	25(18.8)	0(0.0)	44(19.5)	0(0.0)	25(17.8)	44(20.0)
Significance	p < 0.001 ³⁾		p < 0.001 ³⁾		p = 0.819 ^{N.S.}	

1) N(%)

2) N.S. : Not significant by χ^2 -test

3)* : p < 0.05, ** : p < 0.01, *** : p < 0.001 by χ^2 -test

with increased rate of supplement usage ; non-smokers and individuals consumed either no alcohol or moderate amounts of alcohol were more apt to take supplements compared to that of current smoker and drinker, respectively (Lyle et al. 1998 ; Patterson et al. 1998). In a previous study of the Jeonbuk area, there was higher use of Chinese medicine and health food in smokers, habitual drinkers and people who had no exercise, and non-smoker and non-drinker used more dietary supplement and health foods (Chang, Kim 2001). Therefore, it may be suggested that further study is needed for the various supplement categories in detail.

7. Health status and dietetic therapy

Health status and dietetic therapy of age-related chronic disease and control groups with or without supplement are presented in Table 7. The subjects with supplement answered significantly more "poor" and "very poor" in health status compared to those without supplement. Also the subject without supplement answered significantly more "good" and "very good" in health status compared to those without supplement. The subjects with supplement answered significantly more "always" in concerns about health compared to those without supplement. The subjects with supplement had a tendency of more stress, dietetic therapy and self-perceived effect of dietetic therapy compared to those without supplement, but there was no significance. The age-related chronic disease group with supplement had significantly more dietetic therapy and effect of dietetic therapy compared to the control group with supplement. The age-related chronic disease group without supplement had significantly higher in "poor" and "very poor" from self-reported health status, higher stress, higher dietetic therapy and effect of diet therapy compared to the control group without supplement ($p < 0.001$). In a previous study, the subjects with higher self-reported health status showed higher rate of supplement (Koo, Park 2000), but an other study reported different results (Lee et al. 2001). Most of previous studies reported that the subjects with lower self-reported health status and higher concern about health used more supplement use (Chang, Kim 2001 ; Kim 1994 ; Kim et al. 2001 ; Lee et al. 2001 ; Messerer et al. 2001).

Summary and Conclusion

A case-control study was conducted in outpatients aged over 50 years. The subjects were asked their use of supple-

ment for at least a month in the past year. The results of this study are summarized as follows :

1) The rate of age-related chronic disease was 80% in male subjects and 89.5% in female subjects among 1,702 subjects. Male subjects have hypertension, stomach cancer and diabetes, and female subjects have hypertension, diabetes and arthritis.

2) Total rate of supplement usage was 48.9% (male 48.8% female 46.6%). Mean kinds of dietary supplement taken by subjects was 1.7 (male 1.8, female 1.6).

3) The subjects with supplement showed significantly higher frequency of snack and frequency of eating out compared to those without supplement. The control group with supplement had significantly higher frequency of eating out compared to the age-related chronic disease group with supplement. The control group without supplement had significantly higher frequency of snacks, regular meal size and constant meal time compared to the age-related chronic disease group without supplement.

4) The subjects with supplement showed higher nutritional knowledge compared to those without supplement. The control group with supplement showed higher nutritional knowledge compared to the age-related chronic disease group with supplement.

5) The subjects with supplement showed significantly higher nutritional risk factors compared to those without supplement. The age-related chronic disease group with supplement showed higher nutritional risk factors compared to the control group with supplement. There was no significant difference in nutritional risk factors between the age-related chronic disease and the control groups without supplement.

6) The subjects with supplement showed significantly longer ex-smoking periods, more amount of alcohol and number of ex-smoking cigarettes compared to that of those without supplement. The control group with supplement had significantly longer smoking periods compared to the age-related chronic disease group with supplement. The age-related chronic disease group without supplement showed significantly longer ex-smoking periods and higher number of ex-smoking cigarettes compared to the control group without supplement.

7) The subjects with supplement showed significantly worse self-reported health status and higher concern about health compared to those without supplement. The age-related chronic disease group with supplement had significantly more dietetic therapy and effect of diet therapy compared to

the control group with supplement. The age-related chronic disease group without supplement showed significantly worse self-reported health status and more stress compared to the control group without supplement.

In conclusion, elderly needs guidance from dieticians or health professionals to make informed choices on whether to take dietary supplements in terms of individualized assessment and scientific evidence of efficiency and safety.

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