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An Investigation of the Health Foods and Supplements Intake and Its Associated Factors in Middle·Old Aged Adults Living in Seoul and Gyeong-Ki Area

Jeong-Min Shin, Min-June Lee[1] and Jung-Hyun Kim[2§]

Department of Food & Nutrition, Yonsei University, Seoul 120-749, Korea,
[1]Reseach Institude of Food & Nutritional Sciences, Yonsei University, Seoul 120-749, Korea,
[2]Department of Home Economics Education, PaiChai University, Taejeon 302-735, Korea

The aim of this study was to investigate intake of health foods and supplements and its associated factors in middle and old-aged adults in order to contribute to health promotion of Korean population by providing a guide for proper use of health foods and supplements. About 69% of the subjects reported that they were currently taking health foods and supplements or had experiences of having them in the past, whereas 31.2% reported they had never taken them. The most commonly used type of health foods and supplements was vitamin C as reported by 41.8%, followed by others such as lactobacillus products, multi-vitamins, tonic medicine and cardiotonic drug, artificially processed Ginseng foods, vitamin B complex, enzyme supplement, calcium, aloe, apricot extract products, chitosan products, loyal honey, squalene, refined fish oil and iron products. The major reason for taking health foods and supplements was 'to protect the weak constitution' with 155 (42.1%) responses, and the motive for the intake was the suggestion from family·relatives with 235 (63.9%) responses, and the place of purchase was pharmacy with 140 (38.0%) responses, the average monthly expense was 20,000-40,000 won with 140 (26.2%) responses, and effects after the intake was 'so and so' with 180 (33.6%) responses as the highest. More health foods and supplements were consumed as age and education were statistically significantly increased ($p<0.05$). For health and lifestyle and the intake of health foods and supplements, perceived health status, the presence of illness, and the presence of health management were statistically significant ($p<0.05$). Male subjects than female subjects and the 30s than the 40s and 50s were appeared to have poorer dietary behaviors ($p<0.05$). For the health locus of control and the intake of health foods and supplements, the health locus of control score was 22.82 for consumers and 22.79 for non-consumers, showing no significant difference. Logistic regression analysis was performed to find out major factors that affect the intake of health foods and supplements, in which gender, education, smoking, perceived health status, the presence of illness, and health management were significant to the intake of health foods and supplements. It is shown that subjects with perception and attitude of 'health foods and supplements are useful in health maintenance and disease prevention' and 'the information and variety for health foods and supplements are great' have higher probability of taking health foods and supplements.

Key words: Health food and supplements, Health and lifestyle, Dietary behaviors health locus of control

INTRODUCTION

Our country has experienced affluent eating lifestyle due to highly advanced technology, complicated and diversified social structures, and rapid economical development for the past 30 years. While in the modern society, health risk factors such as environmental pollution, stress, and food contamination have been gradually increased, and chronic diseases have also been increased due to the lack of exercise, excessive drinking and smoking, and changes in dietary life. Increased chronic diseases and changed structure in the causes of death have made people more interested in health foods and supplements.

Human being has been interested in its health since its birth, and all people want to enjoy healthy and happy life through sound and proper eating habits. The present time when people have economically affluent food life is the time in which people are more highly interested in health than any other time, and the interest for health foods and supplements has been more and more increased to improve dietary life and health improvement in addition to taking medicine for the treatment of diseases.[1)]

Health foods and supplements are types of foods made with specific ingredients or manufactured from specific

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§ To whom correspondence should be addressed.

ingredients in food sources by extracting, concentrating, or mixing for the purpose of supplementing health.[2-4] The Ministry of Health and Welfare revised the Food and Hygiene Law in 1987[5] and named so-called health foods to health foods and supplements. There was no legal interpretation for health foods and supplements in the Food and Hygiene Enforcement Ordinance of the Ministry of Health and Welfare in 1966 but instead defined as health supplement foods, special nutrient foods, or processed agricultural foods. In the USA, the movement for improving dietary lifestyle has developed during the 1950s and 1960s, and the health food industry has greatly developed since 1977 and people could freely buy nutritional supplementary foods without the disciplinary action by the FDA. The production and sales of health foods and supplements in Korea has greatly increased since late 1980s when food manufacturers developed various types of health foods that attracted consumer's interests.[3-6]

According to the study of Korea Institute for Health and Social Affairs,[2] it is reported that 67% of national population has already had more than one kind of health foods and supplements in the mid 1980s and the interests for health and foods have been more increased since 1990s. However, it has caused some worries in our country because health foods and supplements are used mainly for the purpose of extra strength·super potency or remedy for specific chronic diseases and further labeled as having similar effects as general foodstuff and medical ingredients.[5] Also, it has been flooded with scrappy or exaggerated information for health foods and supplements, which are transferred to the public without any scientific ground and further make them to overly believe and to favor those health foods and supplements, causing some social and health problems.[6-10] In particular, health foods and supplements are largely consumed among aged population and also more consumed in people with weak health or middle and old aged with higher risk of chronic diseases.[2-6] However, these foods are often misused as general drugs and medical ingredients instead of being used as foods that help people to maintain and improve their health, because of improper understanding and simple experience of consumers. Thus, professionals have suggested that it is necessary to establish quality evaluation and distribution management for increased domestic and foreign health foods and supplements and to establish national awareness for health foods and supplements at the level of public health.[2-7]

This study was investigated to find out the actual state of the intake of health foods and supplements for middle and old-aged adults who resided in Seoul and Gyeonggi areas and to examine its associated factors such as health and lifestyle, dietary behaviors, and health locus of control, and then to analyze the effects of those factors on the intake of health foods and supplements.

METHODS

1. Research Topics

The following research topics were assigned to investigate the actual state of the intake of health foods and supplements by middle and old-aged adults who lived in Seoul and Gyeonggi areas and to analyze associated factors that affect the intake of health foods and supplements such as sociodemographic characteristics, perception and attitude for health foods and supplements, health and lifestyle behavior, dietary behavior, and health locus of control.

1) How do sociodemographic characteristics affect the intake of health foods and supplements?

2) How do perception and attitude for health foods and supplements affect the intake of health foods and supplements?

3) How are health and lifestyle behaviors related to the intake of health foods and supplements?

4) How do dietary behavior affect the intake of health foods and supplements?

5) Is the health locus of control related to the intake of health foods and supplements?

2. Subjects & Survey Period

This study was performed for male and female subjects of over 30 years of age who resided in Seoul · Gyeong-gi areas. Survey questionnaire were directly filled out by subjects. Preliminary survey was performed between December 1 and December 15, 2001 for 50 middle-aged people in Dongdaemun-gu, Seoul and then after some modification and complimentation, the main survey was performed for 2 months during January and February of 2002. A total of 800 questionnaire sheets were distributed, including 500 for Seoul area and 300 for Gyeonggi-do area, and 650 questionnaire sheets were returned (81.3%) and the final 535 questionnaire sheets excluding some with incomplete answers were used in the statistical analysis.

3. Survey Contents & Methods

Survey questionnaire was prepared to fit the purpose of this study by modifying and complementing materials used for adults previously[8~11] and general characteristics of subjects, intake and types of health foods and supplements, perception and attitude for health foods and supplements, health and lifestyle behavior, dietary behavior, and health locus of control.

Each survey content was composed as follows.

General characteristics of subjects

Gender(sex), age, height, weight, educational background, occupation, monthly household income, religion, and family type were investigated to find out general characteristics of subjects.

Actual state of the intake of health foods and supplements

Types of health foods and supplements and the intake of each type of health foods and supplements, reasons for the intake, effects after the intake, motives for the intake, places for purchase, and the average monthly expense were investigated to examine the actual state of the intake of health foods and supplements. The range of health food items in the study included 25 health foods and supplements established by the regulations of Food and Hygiene Law[12] and Food Code[13] and invigorating tonics such as deer antlers, black goat, dog extracts, and oriental tonics and cardiotonic drugs, and nutritional supplements.

Subjects were allowed to select health foods and supplements that he/she has taken for the past one year or is taking at the moment. For the consumers of health foods, it was allowed to answer multiple response for reasons for the intake, motives for the intake, places for purchase, and to answer only one from effects after the intake or monthly expense. For non-consumers, multiple responses were allowed for reasons for not taking health foods and supplements.

Perception and attitude for health foods and supplements

It was composed of a total of 13 questionnaire from the survey questionnaire (6 questions) for the perception and attitude for health foods and supplements by Kim[10] and modified and complemented questionnaire (7 questions) by investigators. Answers for each question used 5-point scale from 'very disagree' (1 point) to 'very agree' (5 points), and higher scores were interpreted as more positive perception and attitude for health foods and supplements.

Health & lifestyle behavior

For the investigation of health and lifestyle behavior, it was composed of smoking, drinking, exercise, perceived weight status, perceived health status, presence of illness, health examination, and health management.

Dietary behavior

For the evaluations of usual dietary behavior, survey questionnaire used previously in the study of Kim *et al.*[14] was also used, which was made of the general dietary behavior evaluation (5 questions), the evaluation for balanced food intake (9 questions), and the evaluation for the harmony with living (6 questions). The perfect total score was 100 and higher score meant good dietary behavior; total score of over 80 was evaluated as 'good', total score of 79-60 was 'fair', and total score of less than 59 was 'poor' (Cronbach's α=0.79).

Health locus of control

MHLC (Multidimensional Health Locus of Control Scale) developed by Wallston[15] was modified by selecting questions of internal locus of control, which measured the degree of health control by own will, among multidimensional locus of control and constructed into the content used by Lim.[9] In this study, 4-point scale from 'very agree' (4 points) to 'seldom agree' (1 point) was used and higher points represented higher internal disposition.

3. Data Analysis

Collected data were analyzed by using SPSS PC$^+$ Package Program and means and standard deviations were calculated. Frequency analysis, factor analysis, X^2 -test, t-test, One way ANOVA, Duncan's multiple rang test, and Logistic Regression were used in the analysis.

RESULTS & DISCUSSION

1. General Characteristics of Subjects

General characteristics of subjects were presented in Table 1. The total number of subjects was 535, and male was 285 (53.3%) and female was 250 (46.7%). The age distribution was the highest in the range of 30-39 years with 225 (42.1%), then 40-49 years with 191 (22.2%), and over 50 years with 119 (22.2%). For educational backgrounds, the highest distribution was university graduates with 275 (51.4%), and then high school·junior college graduates with 227 (42.4%), and middle-school graduates and below was 33 (6.2%), showing relatively higher education level. For occupational distribution, male subjects were highly distributed in professional occupation with 111 (38.9%) in professional·administrative jobs and 74 (26.0%) in general office work, and female subjects were highly distributed in housewife with 113 (45.2%) and professional·administrative jobs with 60 (24.0%). The average monthly income was largely distributed between 100-199 (10,000 won) with 148 (27.7%) and 200-299 (10,000 won) with 148 (27.7%). For religion, Christianity with 247 (46.2%), Buddhism with 126 (23.6%), no-religion with 113 (21.1%), and Catholicism with 49 (9.2%). In family type, the highest was nuclear family with 420 (78.5%).

Table 1. General characteristics of subjects

Number(%)

Characteristics	Male	Female	Total
Age(year)			
30-39	139(48.8)	86(34.4)	225(42.1)
40-49	95(33.3)	96(38.4)	191(35.7)
≥50	51(17.9)	68(27.2)	119(22.2)
Education			
≤middle school	12(4.2)	21(8.4)	33(6.2)
High school-college	98(34.4)	129(51.6)	227(42.4)
University-graduate school	175(61.4)	100(40.0)	275(51.4)
Occupation			
Professional	111(38.9)	60(24.0)	71(32.0)
Office worker	74(26.0)	27(10.8)	101(18.9)
Labor & self-employed	62(21.8)	22(8.8)	84(15.7)
Housewife	-	113(45.2)	113(21.1)
Agriculture, fishing, labor	22(7.7)	20(8.0)	42(7.9)
Others	16(5.6)	8(3.2)	24(4.5)
Monthly income (10,000 won)			
<100	22(7.7)	28(11.2)	50(9.3)
100-199	86(30.2)	62(24.8)	148(27.7)
200-299	67(23.5)	54(21.6)	121(22.6)
300-399	39(13.7)	30(12.0)	69(12.9)
≥400	38(13.3)	37(14.8)	75(14.0)
No answer	33(11.6)	39(15.6)	72(13.5)
Religion			
Christianity	134(47.0)	113(45.2)	247(46.2)
Catholicism	19(6.7)	30(12.0)	49(9.2)
Buddhism	59(20.7)	67(26.8)	126(23.6)
Others	73(25.6)	40(16.0)	113(21.1)
Family type			
Married couple	15(5.3)	8(3.2)	23(4.3)
Nuclear family	219(76.8)	201(80.4)	420(78.5)
Extended family	32(11.2)	26(10.4)	58(10.8)
Single	19(6.7)	15(6.0)	34(6.4)
Total	285(100.0)	250(100.0)	535(100.0)

2. Actual State of the Intake of Health Foods and Supplements

Experience for health foods and supplements

Among subjects investigated (Table 2), subjects who has consumed health foods and supplements at present time and in the past was 368 (68.8%), and subjects with no experience of consuming health foods and supplements was 167 (31.2%). In male subjects of their 30s, the number of subject with the consumption experience in the past was 53 (38.1%); in male subjects of their 40s, the number of subjects with and without consumption experience in the past was 34 (35.8%) each; in male subjects of their 50s, the number of subject who has consumed at the moment was 21 (41.2%), showing the highest ratio. In female subjects, the number of subjects with the consumption experience on the past was 35 (40.7%) in the 30s, and the numbers of subjects with current consumption were 36 (37.5%) and 30 (44.1%) in the 40s and 50s, respectively.

Table 2. Intake status of health foods and supplements

Sex	Age	Present	Past	No Intake	Total
Male	30-39	36(25.9)	53(38.1)	50(36.0)	139(100.0)
	40-49	27(28.4)	34(35.8)	34(35.8)	95(100.0)
	≥50	21(41.2)	20(39.2)	10(9.6)	51(100.0)
Total		84(29.5)	107(37.5)	94(33.0)	285(100.0)
Female	30-39	22(25.6)	35(40.7)	29(33.7)	86(100.0)
	40-49	36(37.5)	30(31.3)	30(31.3)	96(100.0)
	≥50	30(44.1)	24(35.3)	14(20.6)	68(100.0)
Total		88(35.2)	89(35.6)	73(29.2)	250(100.0)

Types of health foods and supplements

The number of subjects who responded to have at least one type of health foods and supplements in the past year was 368. In the multiple response from these subjects, vitamin C was the highest with 154 (41.8%) and then came Lactobacillus products with 139 (37.8%), multi-vitamins with 117 (31.8%), invigorating tonics and cardiotonic drugs with 89 (24.2%), and processed ginseng foods with 87 (23.6%).

In male subjects, the highest order of consumption was Lactobacillus products with 72 (37.7%), vitamin C with 71 (37.2%), multi-vitamins with 59 (30.9%), invigorating tonics and cardiotonic drugs with 48 (25.1%), and processed ginseng foods with 42 (22.0%); in female subjects, the highest order of consumption was vitamin C with 83 (46.9%), Lactobacillus products with 67 (37.9%), multi-vitamins with 58 (32.8%), calcium products with 52 (29.4%), and enzyme products with 47 (26.6%). Among 25 health foods and supplements, Lactobacillus products were the highest and then apricot products, squalene products, and aloe products in male subjects; in female subjects, also Lactobacillus products were the highest and then calcium products, enzyme products, and aloe products. Thus except Lactobacilus products, squalene was the highest in male subjects and calcium was the highest in female subjects.

Among different age groups, vitamin C consumption was the highest with 69 (47.3%) and 46 (36.2%) in the 30s and 40s, respectively, and also was the highest with 39 (41.1%) in the 50s. Among 25 health foods and supplements, Lactobacillus products were the highest in the 30s, 40s, and over 50s; then aloe and apricot products were the next highest in the 30s, calcium products and apricot products in the 40s, and calcium products and enzyme products in the 50s, showing that more calcium products were consumed as the age increased.

In the study for the actual state of the consumption of 25 health foods and supplements by Lee,[16] the most consumed product during the recent one year was Lactobacillus products (47.4%) and then apricot products (34.9%) and calcium products (29.9%), which were similar to the results of this study, and also the study by Park[17] showed similar results (Table 3).

Table 3. Types of health foods and supplements by sex and age Number (%)

Health foods and supplements	Male				Female				Total			
	30-39	40-49	>50	Total	30-39	40-49	>50	Total	30-39	40-49	>50	Total
1. Fish oil	16(18.0)	9(14.8)	6(14.6)	31(16.2)	5(8.8)	4(6.1)	7(13.0)	16(9.0)	21(14.4)	13(10.2)	13(13.7)	47(12.8)
2. Royal-jelly	13(14.6)	11(18.0)	8(19.5)	32(16.8)	3(5.3)	10(15.2)	12(22.2)	25(14.1)	16(11.0)	21(16.5)	20(21.1)	57(15.5)
3. Yeast	3(3.4)	2(3.3)	2(4.9)	7(3.7)	3(5.3)	6(9.1)	3(5.6)	12(6.8)	6(4.1)	8(6.3)	5(5.3)	19(5.2)
4. Pollen	5(5.6)	2(3.3)	4(9.8)	11(5.8)	1(1.8)	3(4.5)	5(9.3)	9(5.1)	6(4.1)	5(3.9)	9(9.5)	20(5.4)
5. Squalence	5(16.9)	11(18.0)	8(19.5)	34(17.8)	4(7.0)	8(12.1)	10(18.5)	22(12.4)	19(13.0)	19(15.0)	18(18.9)	56(15.2)
6. Enzyme	9(10.1)	8(13.1)	9(22.0)	26(13.6)	14(24.6)	17(25.8)	16(29.6)	47(26.6)	23(15.8)	25(19.7)	25(26.3)	73(19.8)
7. Lactobacillus	41(46.1)	16(26.2)	15(36.6)	72(37.7)	22(38.6)	27(40.9)	18(33.3)	67(37.9)	63(43.2)	43(38.9)	33(34.7)	139(37.8)
8. Algae	3(3.4)	2(3.3)	3(7.3)	8(4.2)	1(1.8)	2(3.0)	1(1.9)	4(2.3)	4(2.7)	4(3.1)	4(4.2)	12(3.3)
9. γ-linolenic acid	-	-	-	-	1(1.8)	2(3.0)	-	3(1.7)	1(0.7)	2(1.6)	-	3(0.8)
10. Germ	2(2.2)	-	1(2.4)	3(1.6)	1(1.8)	3(4.5)	4(5.9)	8(4.5)	3(2.1)	3(2.4)	5(5.3)	11(3.0)
11. Lecithin products	-	-	-	-	1(1.8)	1(1.5)	-	2(2.1)	1(0.7)	1(0.8)	-	2(0.5)
12. Octacosanol	-	-	-	-	-	1(1.5)	-	1(0.6)	-	1(0.8)	-	1(0.3)
13. Alkoxy	2(2.2)	1(1.6)	-	3(1.6)	1(1.8)	-	1(1.9)	2(1.1)	3(2.1)	1(0.8)	1(1.1)	5(1.4)
14. Grape seed oil	8(9.0)	1(1.6)	2(4.9)	11(5.8)	1(1.8)	1(1.5)	2(3.7)	4(2.3)	9(6.2)	2(1.6)	4(4.2)	15(4.1)
15. Fermented plant products	4(4.5)	-	4(9.8)	8(4.2)	4(7.0)	3(4.5)	2(3.7)	9(5.1)	8(5.5)	3(2.4)	6(6.3)	17(4.6)
16. Proteineous products	10(11.2)	3(4.9)	5(12.2)	18(9.4)	3(5.3)	8(12.1)	6(11.1)	17(9.6)	13(8.9)	11(8.7)	11(11.6)	35(9.5)
17. Chlorophyll	6(6.7)	5(8.2)	5(12.2)	16(8.4)	8(14.0)	7(10.6)	5(9.3)	20(11.3)	14(9.6)	12(9.4)	10(10.5)	36(9.8)
18. Mushroom products	1(1.1)	4(4.2)	2(4.9)	7(3.7)	2(3.5)	2(3.0)	3(5.6)	7(4.0)	3(2.1)	6(4.7)	5(5.3)	14(3.8)
19. Aloe	19(21.3)	5(5.3)	10(24.4)	34(17.8)	11(19.3)	15(22.7)	11(20.4)	37(20.9)	30(20.5)	20(15.7)	21(22.1)	71(19.3)
20. Apricot	18(20.2)	10(16.4)	9(22.0)	37(19.4)	7(12.3)	13(19.7)	11(20.4)	31(17.5)	25(17.1)	23(18.1)	20(21.1)	68(18.5)
21. Soft-shell turtle	-	2(3.3)	1(2.4)	3(1.6)	-	2(3.0)	2(3.7)	4(2.3)	-	4(3.1)	3(3.2)	7(1.9)
22. β-carotene	1(1.1)	1(1.6)	-	2(1.0)	1(1.8)	4(6.1)	-	5(2.8)	2(1.4)	5(3.9)	-	7(1.9)
23. Chitosan	12(13.5)	9(14.8)	6(14.6)	27(14.1)	3(5.3)	11(16.7)	18(33.3)	32(18.1)	15(10.3)	20(15.7)	24(25.3)	59(16.0)
24. Propolis	3(3.4)	-	2(4.9)	5(2.6)	-	2(3.0)	2(3.7)	4(2.3)	3(2.1)	2(1.6)	4(3.4)	9(2.4)
25. Calcium	6(6.7)	8(13.1)	6(14.6)	20(10.5)	8(14.0)	21(31.8)	23(42.6)	52(29.4)	14(9.6)	29(22.8)	29(30.5)	72(19.6)
26. Isoflavon	-	-	-	-	2(3.5)	4(6.1)	1(1.9)	7(4.0)	2(1.4)	4(3.1)	1(1.1)	7(1.9)
27. Iron	3(3.4)	-	-	3(1.6)	7(12.3)	19(28.8)	9(16.7)	35(19.8)	10(6.8)	19(15.0)	9(9.5)	38(10.3)
28. Vitamin A,D	6(6.7)	2(3.3)	5(12.2)	13(6.8)	4(7.0)	3(4.5)	13(24.1)	20(11.3)	10(6.8)	5(3.9)	18(18.9)	33(9.0)
29. Vitamin B complex	13(14.6)	10(16.4)	14(34.1)	37(19.4)	11(19.3)	17(25.8)	13(24.1)	41(23.2)	24(16.4)	27(21.3)	27(28.4)	78(21.2)
30. Vitamin C	39(43.8)	14(23.0)	18(43.9)	71(37.2)	30(52.6)	32(48.5)	21(38.9)	83(46.9)	69(47.3)	46(36.2)	39(41.1)	54(41.8)
31. Vitamin E	4(4.5)	2(3.3)	9(22.0)	15(7.9)	4(7.0)	6(9.1)	10(18.5)	20(11.3)	8(5.5)	8(6.3)	19(20.0)	35(9.5)
32. Multi-vitamins	31(34.8)	14(23.0)	14(34.1)	59(30.9)	16(28.1)	18(27.3)	24(44.4)	58(32.8)	47(32.2)	35(25.2)	38(40.0)	117(31.8)
33. Medicine & cardiotonic drug	21(23.6)	16(26.2)	11(26.8)	48(25.1)	11(19.3)	14(21.2)	16(29.6)	41(23.2)	32(21.9)	30(23.6)	27(28.4)	89(24.2)
34. Processed ginseng foods	22(24.7)	10(16.4)	10(24.4)	42(22.0)	10(17.5)	12(18.2)	23(42.6)	45(25.4)	32(21.9)	22(17.3)	33(34.7)	87(23.6)
Total	89 (100.0)	61 (100.0)	41 (100.0)	191 (100.0)	57 (100.0)	66 (100.0)	54 (100.0)	177 (100.0)	146 (100.0)	127 (100.0)	95 (100.0)	368 (100.0)

Reasons for taking health foods and supplements

For the question on the most important reason for consuming health foods and supplements that was asked to subjects in this study, the most frequent response, when multiple response was allowed, was 'to protect the weak constitution' with 155 (42.1%) responses. Then 152 (41.3%) answered 'to prevent the disease', 78 (21.2%) answered 'to improve physical strength·vigor', 46 (12.5%) answered 'to treat the disease', 21 (5.7%) answered 'to control body weight', and 17 (4.6%) answered 'for beauty effects' (Fig. 1). In studies of Lee,[16] Lim,[9] and Kim,[18] the most frequent responses for the question on the reason for consuming health foods and supplements were to protect the weak constitution and to prevent the disease, showing the same results as those in this study (Fig. 1)

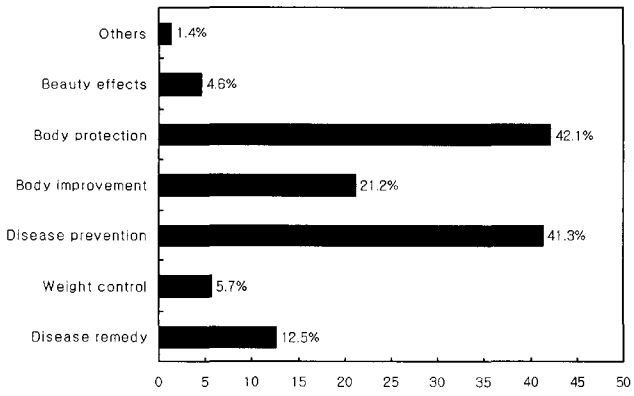

Fig. 1 Reasons for taking health foods and supplements

In male subjects, 76 (39.8%) answered 'to protect the weak constitution' as the most frequent response, and then 70 (36.6%) answered 'to prevent the disease' and 15 (7.9%) answered 'to treat the disease'; in female subjects, 82 (46.3%) answered 'to prevent the disease' as the most frequent response, and then 79 (44.6%)

answered 'to protect the weak constitution' and 31 (17.5%) answered 'to treat the disease', showing no significant gender differences between male and female subjects (Data not shown).

For the age differences, 76 (52.1%) answered 'to protect the weak constitution' as the most frequent response in the 30s, and then 46 (31.5%) answered 'to prevent the disease' and 37 (25.3%) answered 'to improve physical strength·vigor' in the 30s; 55 (43.3%) and 51 (53.7%) answered 'to prevent the disease' as the most frequent answers in the 40s and over 50s, respectively, and then 52 (40.9%) and 27 (28.4%) answered 'to protect the weak constitution' and 24 (18.9%) and 17 (17.9%) answered 'to improve physical strength·vigor' respectively, showing more consumption of health foods and supplements for the prevention of diseases as the age increased.

Motives for the intake of health foods and supplements

For the question on the most important motive for consuming health foods and supplements that was asked to subjects in this study, the most frequent response, when multiple response was allowed, was the suggestion from family and relatives with 235 (63.9%) responses, then the suggestion from doctors and pharmacists with 52 (14.1%) responses, the suggestion from salesperson with 33 (9.0%) responses, and information from TV and radio with 23 (6.3%) responses (Fig. 2). Also in studies by Park,[8] Lim,[9] and Yang,[19] the suggestion from family and relatives was the highest response with each 30.9%, 56.6%, and 80.0% respectively, showing the same result as in this study.

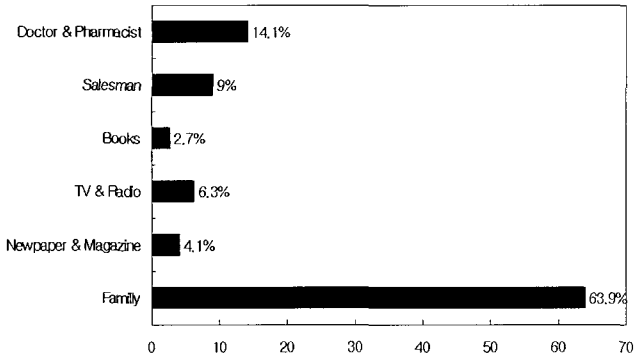

Fig. 2 Motives for the intake of health foods and supplements

Places and methods for purchasing health foods and supplements

From the question on where and how health foods and supplements purchased, the most frequent response was pharmacy with 140 (38.0%) responses, and then came presents with 79 (21.5%) responses, health food store with 65 (17.7%) responses, Chinese hospital with 57 (15.5%) responses, visit selling with 54 (14.7%) responses, internet selling with 18 (4.9%) responses, cooking with 15 (4.1%), and department store with 10 (2.7%)(Fig. 3).

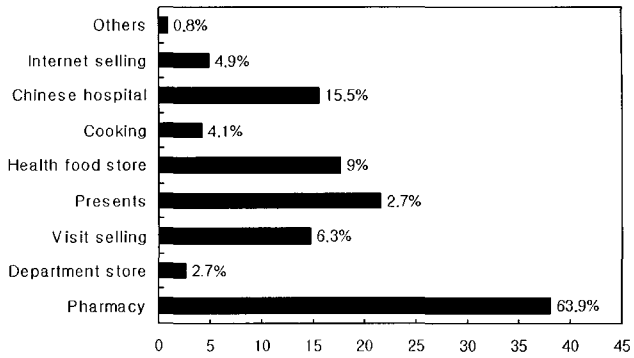

Fig. 3 Method and places for purchasing health foods and supplements

Average monthly expense for health foods and supplements

Among 368 subjects who consumed health foods and supplements, 140 (26.2%) paid 20,000-40,000 won for average monthly purchase, which was the most frequent response, 99 (18.5%) paid less than 10,000 won, 74 (13.8%) paid 50,000-90,000 won, 38 (7.1%) paid 100,000-140,000 won, 13 (2.4%) paid 200,000-290,000 won, and 4 (0.7%) paid over 300,000 won (Fig. 4).

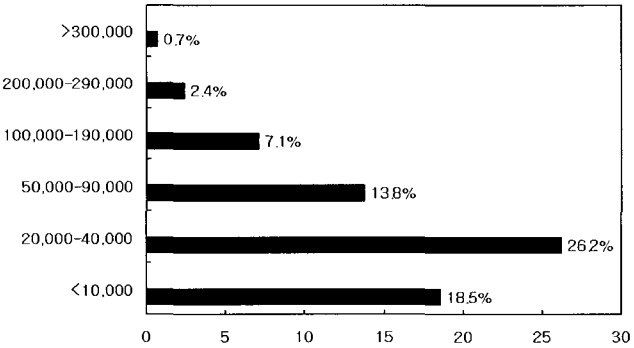

Fig. 4 Monthly purchase price of health foods and supplements

Effects after the intake of health foods and supplements

Results for the question on the effect after consuming health foods and supplements showed that 'so and so' was the highest with 180 (33.6%) responses, and then 102 (19.1%) answered 'health improvement', 84 (15.7%) answered 'I don't know', and 2 (0.4%) answered 'worse than before' (Fig. 5). In the study by Choi,[20] 'health was not better after the intake of health foods' was 65.6% and 'health was better' was 31.2%, showing the difference between them and the result from this study. However, results in the study by Yang,[19] which showed

'some effects' (14.2%), 'so and so' (78.9%), and 'no effect' (6.9%), were similar to those in this study. Thus, as the results in the study by Park,[17] it can be interpreted that most people who consume health foods and supplements, in general, accept the effects of health foods and supplements positively.

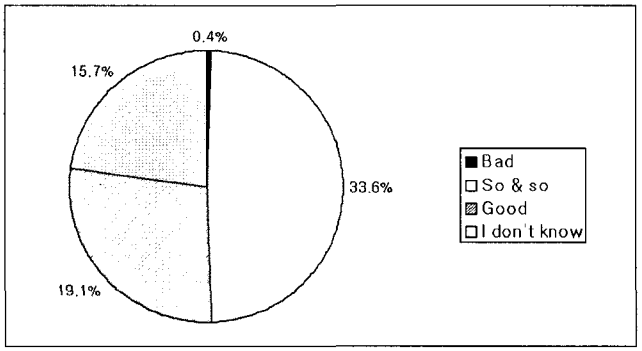

Fig. 5 Perceiving effects of the intake of health foods and supplements

Reasons for not taking health foods and supplements

For 167 subjects who did not consume health foods and supplements, the most important reason of not taking these products, when multiple response was allowed, was 'unnecessary because I am healthy now' with 60 (35.9%) responses, and then 59 (35.3%) answered 'good dietary pattern is enough', 44 (26.4%) answered 'distrust for effects', 9 (5.4%) answered 'too expensive', and 8 (4.8%) answered 'adverse effects'.

According to the results of Park,[17] 50.5% of non-consumers answered 'unnecessary' and 24.2% answered 'good dietary pattern is enough', which were consistent with results in this study (Fig. 6).

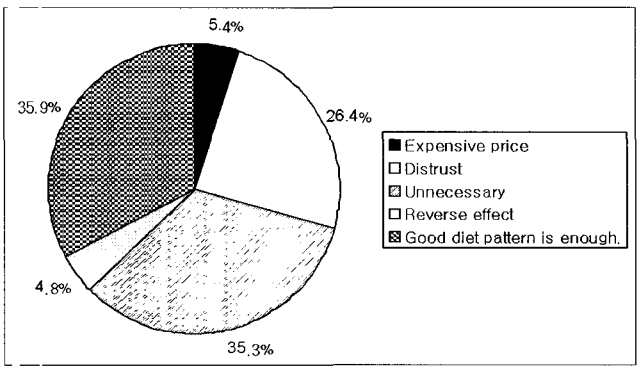

Fig. 6 Reasons for not taking health foods and supplements health foods and supplements

3. Perception and Attitude for Health Foods and Supplements

Perception and attitude for health foods and supplements by 535 subjects were shown in Table 4. When examining responses to each question, there was more responses as 'agree' for questions such as health foods and supplements 'treat disease or maintains health' and 'easy to get the information or the kinds are various'. On the other hand, there was more responses as 'disagree' for questions such as 'health foods and supplements treat disease', 'the price is proper', and 'side effects don't exist in general'. Thus, perception and attitude for the aspects of health maintenance and disease prevention of health foods and supplements were relatively positive, but those for the aspects of safety, trust, and price of health foods and supplements were shown negative (Table 4).

Means and standard deviations were shown in Table 5 when each question was scored by 5-point scale. Means and standard deviations of perception and attitude between consumers and non-consumers of health foods and supplements were not greatly different but, in general, scores of consumers were higher than those of non-consumers. Thus, perception and attitude of consumers for health foods and supplements were more positive than those of non-consumers. When examining questions related to perception and attitude for health foods and supplements, both consumers and non-consumers showed higher scores in questions such as 'the kind of health foods and supplements are various' and 'health foods and supplements are easy to purchase' while showed the lowest score in the question 'health foods and supplements treat diseases that are not treated by medicine'. The result of t-test for the difference between consumers and non-consumers on the perception and attitude for health foods and supplements showed that it was statistically significant in all questions except questions such as 'it is easy to get the information on health foods and supplements', the price of 'health foods and supplements is generally proper', and 'health foods and supplements don't have side effects in general' ($p<0.05$)(Table 5).

While the factor analysis for a total of 13 questions was performed to investigate the effect of perception and attitude of subjects for health foods and supplements on the intake of those products. Factor extraction was made by generally used principal component analysis, and factor rotation was performed by orthogonal rotation (varimax) and then 3 factors with more than 1.0 eigenvalue were extracted per each question. After the factor analysis, 13 questions were grouped into 3 factors. As shown in Table 5, perception and attitude for health maintenance and disease prevention (Q3, Q4 and Q5) were grouped as factor 1, perception and attitude for safety and trust (Q1, Q2, Q6, Q7, Q11 and Q12) were grouped as factor 2, and perception and attitude for information and foods variety (Q8, Q9, Q10 and Q13)

Table 4. Perception and attitude for health foods and supplements of subjects Number(%)

Question	very agree	agree	normal	disagree	very disagree
1. It is the same as medicine.	-	75(14.0)	156(29.2)	233(43.6)	71(13.3)
2. It treats diseases.	-	48(9.0)	80(15.0)	295(55.1)	112(20.9)
3. It prevents diseases.	21(3.9)	305(57.0)	117(21.9)	63(11.8)	29(5.4)
4. It maintains health or improves constitution.	31(5.8)	343(64.1)	114(21.3)	40(7.5)	7(1.3)
5. It has special nutrients.	19(3.6)	248(46.4)	176(32.9)	81(15.1)	11(2.1)
6. It is good for health.	13(2.4)	218(40.7)	202(37.8)	88(16.4)	14(2.6)
7. The effects are proved.	5(0.9)	100(18.7)	307(57.4)	106(19.8)	17(3.2)
8. It is easy to purchase.	71(13.3)	379(70.8)	56(10.5)	29(5.4)	-
9. It is easy to get the information.	47(8.8)	289(54.0)	128(23.9)	67(12.5)	4(0.7)
10. The kinds are various.	130(24.3)	332(62.1)	59(11.0)	13(2.4)	1(0.2)
11. The price is proper.	4(0.7)	38(7.1)	119(22.2)	294(55.0)	80(15.0)
12. Side effects don't exist in general.	4(0.7)	103(19.3)	191(35.7)	205(38.3)	32(6.0)
13. It is recommended by so many people around.	32(6.0)	226(42.2)	153(28.6)	118(22.1)	6(1.1)

Table 5. Comparison of perception and attitude of user and on-user of over the health foods · supplements

Question	users	non-users	Total
1. It is the same as medicine.*	2.55±0.91	2.20±0.79	2.44±0.89
2. It treats diseases.*	2.20±0.88	1.95±0.71	2.12±0.84
3. It prevents diseases.*	3.60±0.86	3.04±1.00	3.42±0.94
4. It maintains health or improves constitution*	3.79±0.67	3.37±0.85	3.66±0.76
5. It has special nutrients.*	3.45±0.80	3.11±0.92	3.34±0.85
6. It is good for health.*	3.36±0.82	2.98±0.84	3.24±0.85
7. The effects are proved.*	3.06±0.71	2.69±0.75	2.94±0.74
8. It is easy to purchase.*	3.97±0.64	3.81±0.73	3.92±0.67
9. It is easy to get the information.	3.62±0.85	3.48±0.84	3.58±0.85
10. The kinds are various.*	4.14±0.68	3.95±0.66	4.08±0.68
11. The price is proper.	2.27±0.82	2.27±0.82	2.24±0.82
12. Side effects don't exist in general.	2.74±0.89	2.62±0.83	2.70±0.87
13. It is recommended by so many people around.*	3.43±0.86	3.01±0.97	3.30±0.92

* $p<0.05$

Table 6. Factor Analysis of perception and attitude over the health foods and supplements

Perception and attitude over the health foods and supplements	Factor 1[1)]	Factor 2[2)]	Factor 3[3)]
It prevents diseases.	.749		
It maintains health or improves constitution.	.777		
It has special nutrients.	.635		
It is the same as medicine.		.502	
It treats diseases.		.498	
It is good for the health.		.531	
The effects are proved.		.583	
The price is proper.		.679	
Side effects don't exist in general.		.752	
It is easy to purchase.			.784
It is easy to get the information.			.799
The kinds are various.			.645
It is recommended by so many people around.			.460

1) Health factor, 2) Safety · trust factor, 3) Practical factor,
(Factor extraction: principal component analysis(factor rotation): varimax with Kaiser normalization)

were grouped as factor 3. The major purpose of factor extraction by grouping perception and attitude for health foods and supplements in this study was to analyze whether perception and attitude of subjects for foods affect the intake of health foods and supplements. Therefore, 3 factors extracted by factor analysis were used as independent variables of logistic regression in the last part of this study (Table 6).

4. Variables Affecting the Intake of Health Foods and Supplements

General characteristics

The relationship between sociodemographic characteristics and the intake of health foods and supplements was shown in Table 7, in which gender, occupation, and monthly income were not statistically significant, but age

and education were statistically significant ($p<0.05$).

Park[8] reported in the results on the relationship among the intake of nutrient supplements and health foods, dietary behavior and health that there was no significant differences among the intake and gender, marriage status, education, and occupation, but the intake was increased as age and monthly income were increased. When compared to the results of this study, there was significant relationship with age increase but showed different results with other variables (Table 7).

Table 7. General characteristics of subjects and intake of health foods and supplements Number(%)

		Intake		
		Yes	No	Total
Sex	Male	191(67.0)	94(33.0)	285(100.0)
	Female	177(70.8)	73(28.2)	250(100.0)
		X^2 =0.887	p=0.352	
Age(year)	30-39	146(64.9)	79(35.1)	225(100.0)
	40-49	127(66.5)	64(33.5)	191(100.0)
	>50	95(79.8)	24(20.2)	119(100.0)
		X^2 = 8.822	p=0.012	
Education				
Primary-middle school		21(63.6)	12(36.4)	33(100.0)
High school-college		138(60.8)	89(39.2)	227(100.0)
University-graduate school		209(76.0)	66(24.0)	275(100.0)
		X^2 = 13.828	p=0.001	
Job				
Professional		121(70.8)	50(29.2)	171(100.0)
Office worker		68(67.3)	33(32.7)	101(100.0)
Blue collar		50(59.5)	34(30.1)	84(100.0)
Housewife		79 (69.9)	34(30.1)	113(100.0)
Agriculture, fishing, labor		32(76.2)	10(23.8)	42(100.0)
		X^2=4.861	p=0.302	
Monthly income (10,000 won)				
>100		29(58.0)	21(42.0)	50(100.0)
100 -199		103(69.6)	45(30.4)	148(100.0)
200 -299		83(68.6)	38(31.4)	121(100.0)
300 -399		46(66.7)	23(33.3)	69(100.0)
<400		56(74.7)	19(25.3)	75(100.0)
		X^2 = 4.064	p=0.397	

Health related lifestyle behavior

The relationship between health related lifestyle and the intake of health foods and supplements, as in Table 8, showed that subjects whose perceived health status was poor had higher intake of health foods and supplements as 87.4% (76), and subjects with the presence of illness had higher intake of health foods and supplements than those with the absence of illness as 84.7% (144). Subjects with health management had higher intake of health foods and supplements as 76.0% (209) than those without health management, which was statistically significant ($p<0.05$). However, smoking, drinking, exercise, perceived weight status, and health examination were not significant with the intake of health foods and supplements. This was different from the result of Lee[16] in which people with no smoking and drinking habits consumed more health foods and supplements (Table 8).

Table 8. Health related life style and the intake of health foods and supplements Number(%)

		Intake		
		Yes	No	Total
Smoking	Yes	157(70.4)	66(29.0)	223(100.0)
	No	211(67.6)	101(32.4)	312(100.0)
		X^2=3.668	p=0.300	
Drinking	Yes	146(69.5)	64(30.5)	210(100.0)
	No	222(68.3)	103(31.7)	325(100.0)
		X^2=2.552	p=0.635	
Excercise	Yes	195(72.8)	73(27.2)	268(100.0)
	No	173(64.8)	94(35.2)	267(100.0)
		X^2=5.306	p=0.151	
Perceived weight status				
Under weight		43(69.4)	19(30.6)	62(100.0)
Normal weight		160(67.2)	78(32.8)	238(100.0)
Over weight		145(71.1)	59(28.9)	204(100.0)
Obesity		20(64.5)	11(35.5)	31(100.0)
		X^2=1.041	p=0.791	
Perceived health status				
Poor		76(87.4)	11(12.6)	87(100.0)
Fair		238(67.8)	113(32.2)	351(100.0)
Good		54(55.7)	43(44.3)	97(100.0)
		X^2=21.902	p=0.000	
Presence of illness				
Yes		144(84.7)	26(15.3)	170(32.4)
No		217(61.3)	137(38.7)	329(67.6)
		X^2=29.360	p=0.000	
Health examination				
Yes		148(71.8)	58(28.2)	206(100.0)
No		220(66.9)	109(33.1)	329(100.0)
		X^2=1.460	p=0.227	
Health management				
Yes		209(76.0)	66(24.0)	275(51.5)
No		159(61.4)	100(38.6)	259(48.5)
		X^2=13.290	p=0.000	

Dietary behavior

The total score of dietary behavior was shown in Table 9, in which mean and standard deviation for consumers of health foods and supplements were 61.30±17.30 and those for non-consumers of health foods and supplements were 62.47±17.66, showing no significant differences in dietary behavior and the intake of health foods and supplements. When the total score of dietary behavior

Table 9. Dietary behavior and intake of health foods and supplements Number(%)

	Intake		
	Yes	No	Total
Poor	150(40.8)	67(40.1)	217(40.6)
Fair	167(45.4)	72(43.1)	239(44.7)
Good	51(13.9)	28(16.8)	79(14.8)
	X^2=0.801	p=0.670	
Mean±SD[1)]	61.30±17.3	62.47±17.66	61.89±17.48

1) Score of Food Behavior

was divided as 'poor' for less than 60, 'fair' for 60-79, and 'good' for over 80, the classification of dietary behavior and the intake of health foods and supplements in general were not statistically significant (Table 9).

Health locus of control

As shown in Table 10 for the health locus of control and the intake of health foods and supplements, the result of 7 questions with 4-point scale that were asked to 535 subjects was the average of 22.81 (81.5%) out of 28 points. That is, subjects in this study were appeared as having higher internal disposition who believed that health was controlled by their own behavior. However, in the health locus of control score, the mean and standard deviation for consumers of health foods and supplements was 22.82±3.31 and that for non-consumers of health foods and supplements was 22.79±3.32, showing no difference between health locus of control score and the intake of health foods and supplements. Also, the relationship between the health locus of control and the intake of health foods and supplements was t-tested, in which the t value was 1.058 and the significant probability was 0.304, showing that the relationship between the intake of health foods and supplements and the health locus of control was not statistically significant. This was different from the result of Lim[9] in which the intake of health foods and supplements was higher as internal disposition was higher.

While for the difference between the health locus of control score and gender, the mean and standard deviation for male subjects were 23.30±3.21 and those for female subjects were 22.26±3.35, showing higher values in male subjects. Also, the difference with ages showed 23.20±3.07 in the 30s, 23.32±2.90 in the 40s, and 21.95±3.61 in the 50s, and the health locus of control score in the 40s was slightly higher than those of other age groups but not statistically significant (Table 10).

Table 10. Health locus of control and intake of health foods and supplements

Health locus of control score		Mean	SD
Health foods	Consumer	22.82	3.31
	Non-consumer	22.79	3.32
Sex	Male	23.30	3.21
	Female	22.26	3.35
Age(year)	30-39	23.20	3.07
	40-49	23.32	2.90
	>50	21.95	3.61

Analysis of influence of various factors that affect the intake of health foods and supplements

Logistic regression analysis was performed to find variables that affected the intake of health foods and supplements as shown in Table 11, in which Factor 1, Factor 3, gender, education, smoking, perceived health status, presence of illness, and presence of health management were sown as significant variables. That is, perception and attitude that the intake of health foods and supplements was health maintenance and disease

Table 11. Logistic regression for the intake of health foods and supplements

Variable	B	Probability	Odds
Health locus of control	.064	.083	1.066
Factor1	.769	.000	2.158
Factor2	.472	.056	1.604
Factor3	.730	.001	2.076
(Sex: Standard=Male) Female	.856	.017	2.353
(Age: Standard=30-39) 40-49	.398	.163	1.488
>50	.634	.092	1.885
(Education: Standard=Primary-middle school)			
High school-college	.242	.608	1.274
University-graduate school	1.325	.011	3.763
(Job: Standard=Professional)			
Office worker	.063	.853	1.065
Blue collar	-.142	.702	.868
Housewife	.007	.986	1.007
Agriculture, fishing, labor	.877	.093	2.403
(Income: Standard (10,000 won)=<100)			
100-199	.497	.137	1.643
200-299	.149	.670	1.160
300-399	-.339	.406	.713
>400	.101	.816	1.106
(Smoking: Standard=No)			
Past	1.115	.009	3.050
Sometimes	1.072	.062	2.920
Everyday	.552	.154	1.738
(Drinking: Standard=No)			
Monthly 1-2	-.176	.526	.839
Weekly 1-2	.064	.853	1.066
Weekly 3-4	-.046	.928	.955
Everyday	1.400	.165	4.056
(Exercise: Standard=No)			
Weekly 1	.425	.140	1.529
Weekly 2-3	.148	.695	1.159
Weekly 4-5, everyday	.420	.307	1.522
(Perceived weight status: Standard=Under weight)			
Normal weight	-.252	.507	.777
Over weight	-.240	.533	.787
Obesity	-.699	.226	.497
(Perceived health status: Standard=Fair)			
Poor	.891	.028	2.439
Good	-.555	.063	.574
(Illness: Standard=No) Yes	.678	.018	1.969
(Health examination: Standard=No) Yes	.225	.364	1.253
(Health management: Standard=No) Yes	-.608	.016	.544
(Food behavior score: Standard=Fair)			
Poor	.228	.390	1.256
Good	-.355	.289	.701

prevention (Factor 1) and perception and attitude for the information and variety of health foods and supplements (Factor 3) were shown to affect the intake of health foods and supplements significantly. Also, female subjects had more probability to consume health foods and supplements than male subjects, and the Odds value of the university·graduate school group for consuming health foods and supplements was 3.765 times higher when below middle-school was considered as the base, meaning that higher education consumed more health foods and supplements. In health and lifestyle, particularly in smoking when 'No' was used as a baseline, subjects who smoked in the past but not in the present or who perceived their health as poor, and who had diseases consumed more health foods and supplements. Also, the Odds value of subjects with health management for consuming health foods and supplements was 0.544, meaning that subjects with health management consumed less health foods and supplements than those without health management. These results, as results of the study by Park,[6] were appeared because people who perceived as having diseases tended to consume more health foods and supplements to restore their health status, and the intake of health foods and supplements has been often practiced by people's own judgment such as health management (Table 11).

Results from this study can become the basis for the development of nutrition and health education materials at the level of health management by focusing on health foods and supplements in the future. Further, it can promote desirable activation of health food industry and guide people to proper selection of health foods and supplements, and finally contribute to the promotion of national public health.

SUMMARY AND CONCLUSION

This study was performed to investigate the actual state of the intake of health foods and supplements for middle and old-aged adults in Seoul and Gyeonggi areas and to analyze various factors that affected the attitude for and the intake of health foods and supplements.

Results of this study are summarized as follows:

1. The age distribution of subjects was the highest in the range of 30-39 years with 139 (48.8%) male subjects, and in the range of 40-49 years with 96 (38.4%) female subjects. For educational background, university·graduate school was the highest with 175 (61.4%) in male subjects while high school·junior college was the highest with 129 (51.6%) in female subjects. For occupation, professional and administrative jobs were the highest with 111 (38.9%) in male subjects and housewife was the highest with 113 (45.2%) in female subjects. The average monthly income was the highest in 100-199 (10,000 won) with 148 (27.7%) responses, and the religion was the highest in Christianity with 247 (46.2%), and family type was the highest in nuclear family with 420 (78.5%).
2. The actual state of the intake of health foods and supplements showed that the number of subjects with the experience of health foods and supplements in the past or present time was (68.7%) and that without the experience was 167 (31.2%). The most consumed health foods and supplements was vitamin C with 154 (41.8%) responses, and then came Lactobacillus products, multi- vitamins, invigorating tonics and cardiotonic drugs, pro- cessed ginseng foods, vitamin B complex, enzyme products, calcium products, aloe, apricot products, chitosan, royal jelly, squalene, fish oil, and iron supplements.
3. The major reason for taking health foods and supplements was 'to protect the weak constitution' with 155 (42.1%) responses, and the motive for the intake was the suggestion from family·relatives with 235 (63.9%) responses, and the place of purchase was pharmacy with 140 (38.0%) responses, the average monthly expense was 20,000-40,000 won with 140 (26.2%) responses, and effects after the intake was 'so and so' with 180 (33.6%) responses as the highest.
4. The most important reason for not taking health foods and supplements was 'unnecessary' with 60 (35.9%) responses and 'good dietary pattern is enough' with 59 (35.3%) responses, and then 'distrust' with 44 (26.4%) responses, 'too expensive' with 9 (5.4%) responses, and 'adverse effect' with 8 (4.8%) responses.
5. For the sociodemographic characteristics and the intake of health foods and supplements, age and education were appeared as statistically significant ($P<0.05$). That is, more health foods and supplements were consumed as age and education were increased.
6. For health and lifestyle and the intake of health foods and supplements, perceived health status, the presence of illness, and the presence of health manage- ment were statistically significant ($p<0.05$). That is, subjects whose perceived health status was poor and subjects with the presence of illness had higher intake of health foods and supplements while subjects with health management had higher intake of health foods and supplements.
7. For dietary behavior and the intake of health foods and supplements, the classification of dietary behavior (poor, fair, good) and gender and age differences were shown as statistically significant ($p<0.05$). That is, male subjects than female subjects and the 30s than the 40s and 50s were appeared to have poorer dietary behaviors.

8. For the health locus of control and the intake of health foods and supplements, the health locus of control score was 22.82 for consumers and 22.79 for non-consumers, showing no significant difference.
9. Logistic regression analysis was performed to find out major factors that affect the intake of health foods and supplements, in which gender, education, smoking, perceived health status, the presence of illness, and health management were significant to the intake of health foods and supplements. That is, female than male, university and graduate school than below middle school, smoking experience in the past (even not smoking in the present) than no experience in smoking, and subjects with poor perceived health status and the presence of illness consumed more health foods and supplements. While subjects with health management had higher intake of health foods and supplements than subjects without health management. It is shown that subjects with perception and attitude of 'health foods and supplements are useful in health maintenance and disease prevention' and 'the information and variety for health foods and supplements are great' have higher probability of taking health foods and supplements.

Thus, results obtained from the actual state of the intake of health foods and supplements in the middle and old-aged adults through this study suggest that it is necessary to establish a proper educational program to prevent the thoughtless intake of health foods and supplements and to practice self health management by selecting health foods and supplements appropriate for health and lifestyle. Also, results obtained from various factors that affect health foods and supplements suggested that it is required to establish a sales system with approved quality and guidelines to make people consume health foods and supplements that fit to the health status of consumers.

It is suggested that the range of subjects should be expanded to improve the representative of research results in the future and repeated researches for the validity and reliability of research tools in health foods and supplements and their associated factors should be continued. Also, the government should devote to the improvement of public health through the reexamination of its systems to help consumers to take health foods and supplements for their purposes.

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