

## Diet and Health-Related Factors of the Middle-Aged and the Elderly in Korea \*

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### ABSTRACT

This study was designed to assess diet and health-related factors of older adults in Korea. Subjects were 2,660 adults aged 50 and over living in Korea. Males were 847 persons and females were 1813 persons. The mean weight and height for males and females were  $63.8 \pm 0.3\text{kg} / 164.0 \pm 0.2\text{cm}$  and  $57.0 \pm 0.2\text{kg} / 150.6 \pm 0.1\text{cm}$  respectively. BMI (body mass index), body fat, and percent fat were significantly greater in females than in males. The muscle mass and body water were significantly greater in males than in females. Twenty-one percent of total subjects lived alone and 26% with spouse only. Most of the subject's self-reported income was in middle level (65%) or low level (24%). Proportion of subjects who answered 'very poor' or 'poor' on perceived health status was higher in older group. The 50 - 64 years old group was facing more stress than 65yr and over group. Among male subjects, 38.4% were current-smokers and 22.0% were ex-smokers. But only 6.5% of female subjects were current-smokers. Males turned out to have better dietary habits-meal frequency per day, mealtime regularity, regular meal size and balanced eating-than females ( $p < 0.001$ ). This study revealed that the diet and health-related factors affect nutritional status and chronic diseases of the elderly. For better management and evaluation of health status of the elderly, more effective nutritional assessment tools should be developed. (*J Community Nutrition* 4(1) : 29~37, 2002)

**KEY WORDS** : middle-aged · elderly · diet and health-related factors.

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### Introduction

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In Korea, the proportion of older adults aged 65 and over was 6.9% in 2000 and it will be increased to 14.3% in 2022 (MOHW 2000). A major concern regarding this dramatic increase in the numbers and proportions of aged adults is the level of morbidity and associated reductions in functional ability in the elderly that can ensue (Zohoori 2001). With a change in living arrangement the elderly became 'the isolated'

and 'the neglected'. Accordingly, the expenditure of medical treatment is increased. Especially, the elderly living alone tend to be malnourished because of their low appetite and decreased food intake.

The elderly health status could be affected by socio-economic status, life style, dietary habits, and nutritional factors. Health status of the elderly might be related to factors including income, education, job opportunity, employment, marital status, family structure, and gender (Kim et al. 2000).

An important task is to identify malnourished elderly and those who are at nutritional risk in order to treat and prevent malnutrition (Schneider et al. 2000 ; Hart 2002).

Three modifiable risk factors of life style-cigarette smoking, alcohol consumption and exercise-affect the health of the elderly. Smoking decreases sensitivity of taste and declines appetite. Heavy drinking causes malnutrition. Regular

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exercise enhances health and lack of exercise decreases digestibility and body function (Yim 2002 ; Kim 1997).

Therefore, it becomes more and more important to monitor and evaluate the diet and health-related factors of the elderly. Poor nutritional status may indicate other underlying chronic diseases (Nourhashemi et al. 1999 ; Vellas et al. 2001).

The purpose of this study was to assess diet and health-related factors of the elderly in order to provide the baseline data for establishing dietary guidelines for the middle-aged and the elderly.

## Subjects and Methods

### 1. Subjects

A nationwide cross-sectional survey was conducted in 7 metropolitan cities (Seoul, Busan, Daegu, Daejeon, Gwangju, Ulsan, and Incheon) and 8 medium-sized cities (Suwon, Anyang, Sungnam, Cheonan, Chungju, Jeonju, Jinju, and Chuncheon) throughout Korea. The total number of subjects was 2,660. Old adults of 50 – 64yr of age and elders of 65yr and over (847 men and 1813 women) were recruited by their own will. The reason of including aged 50 – 64yr group in this study was that many diseases related life style and food habits are chronic, degenerative diseases starting from middle ages. The survey was carried out from October to December, 2000.

### 2. Anthropometric data

Heights and weights were measured by trained interviewer. Body composition (muscle mass, body fat, fat percent, body water) was measured using bioelectrical impedance analysis

(InBody 3.0, Biospace Co. Ltd, Seoul, Korea).

### 3. Health-related factors

Data were collected by interviewing with questionnaires by trained dietitians and nutrition graduated students. Variables in the questionnaire included socioeconomic characteristics, perceived health status, lifestyle, and dietary habits. Socio-economic characteristics included family, marital status, education, occupation, economic level, allowances, and food purchase and preparation. Perceived health status included concern for health, stress, depression and life style included items related to cigarette smoking, alcohol drinking,

**Table 1.** Distribution of subjects according to gender and age group

Age (yr)	Male	Female	Total
50 – 64	192 <sup>1)</sup> (7.2)	417 (15.7)	609 (22.9)
65 – 74	414 (15.5)	994 (37.4)	1408 (52.9)
75 ≤	241 (9.1)	402 (15.1)	643 (24.2)
Total	847 (31.8)	1813 (68.2)	2660 (100.0)

1) : number of subjects

( ) : percentage of subjects

**Table 2.** Age and anthropometric characteristics by gender

Variables	Male (n = 847)	Female (n = 1813)	Total (n = 2660)
Age (yr)	69.3 ± 0.3	69.0 ± 0.2	69.1 ± 0.2
Height (cm)	164.0 ± 0.2****	150.6 ± 0.1	154.8 ± 0.2
Weight (kg)	63.8 ± 0.3****	57.0 ± 0.2	59.2 ± 0.2
BMI (kg/m <sup>2</sup> )	23.7 ± 0.1	25.1 ± 0.1****	24.7 ± 0.1
Muscle mass (kg)	45.8 ± 0.2****	35.2 ± 0.1	38.3 ± 0.1
Body fat (kg)	15.6 ± 0.2	19.6 ± 0.1****	18.4 ± 0.1
Percent fat (%)	24.3 ± 0.2	34.0 ± 0.1****	30.9 ± 0.1
Body water (kg)	33.0 ± 0.2****	26.0 ± 0.1	28.1 ± 0.1

Mean ± SE

\*\*\*\* : p < 0.0001 by student's t-test

BMI : Body Mass Index = body weight (kg) / height (m)<sup>2</sup>

**Table 3.** Anthropometric characteristics according to gender and age group

(unit : %)

Variables	Male			p*	Female			p
	50 – 64	65 – 74	75 ≤		50 – 64	65 – 74	75 ≤	
Age (yr)	56.9 ± 0.4 <sup>c</sup>	69.3 ± 0.1 <sup>b</sup>	79.0 ± 0.2 <sup>a</sup>	<0.0001	58.7 ± 0.2 <sup>c</sup>	69.3 ± 0.1 <sup>b</sup>	78.8 ± 0.2 <sup>a</sup>	<0.0001
Height (cm)	166.0 ± 0.4 <sup>a</sup>	164.2 ± 0.3 <sup>b</sup>	161.9 ± 0.4 <sup>c</sup>	<0.0001	153.6 ± 0.3 <sup>c</sup>	150.7 ± 0.2 <sup>b</sup>	147.4 ± 0.3 <sup>c</sup>	<0.0001
Weight (kg)	67.7 ± 0.6 <sup>a</sup>	63.9 ± 0.4 <sup>b</sup>	60.5 ± 0.6 <sup>c</sup>	<0.0001	59.7 ± 0.4 <sup>a</sup>	57.6 ± 0.3 <sup>b</sup>	52.9 ± 0.4 <sup>c</sup>	<0.0001
BMI (body mass index)	24.5 ± 0.2 <sup>a</sup>	23.7 ± 0.1 <sup>b</sup>	23.0 ± 0.2 <sup>c</sup>	<0.0001	25.3 ± 0.2 <sup>a</sup>	25.3 ± 0.1 <sup>a</sup>	24.3 ± 0.2 <sup>b</sup>	<0.0001
Muscle mass (kg)	49.0 ± 0.4 <sup>a</sup>	45.8 ± 0.3 <sup>b</sup>	42.5 ± 0.4 <sup>c</sup>	<0.0001	37.4 ± 0.2 <sup>a</sup>	35.4 ± 0.1 <sup>b</sup>	32.6 ± 0.2 <sup>c</sup>	<0.0001
Body fat (kg)	16.2 ± 0.4	15.2 ± 0.3	15.7 ± 0.4	NS	20.5 ± 0.3 <sup>a</sup>	19.9 ± 0.2 <sup>a</sup>	18.3 ± 0.3 <sup>b</sup>	<0.0001
Percent fat (%)	23.9 ± 0.4 <sup>b</sup>	24.1 ± 0.3 <sup>b</sup>	25.1 ± 0.4 <sup>a</sup>	<0.0001	33.2 ± 0.3 <sup>b</sup>	34.3 ± 0.2 <sup>a</sup>	33.7 ± 0.3 <sup>ab</sup>	0.0043
Body water (kg)	35.6 ± 0.4 <sup>a</sup>	32.7 ± 0.3 <sup>b</sup>	30.9 ± 0.3 <sup>c</sup>	<0.0001	27.5 ± 0.2 <sup>a</sup>	26.2 ± 0.1 <sup>b</sup>	24.1 ± 0.2 <sup>c</sup>	<0.0001

Mean ± SE (Standard Error)

\* : significance of F value by one-way ANOVA

a,b,c : values with different superscript letters within a row by gender are significantly different from each other at a = 0.05 by Duncan's multiple range test

**Table 4.** Socio-economic characteristics of subjects by gender (unit : %)

Variables	Total (n = 2660)	Male (n = 847)	Female (n = 1813)	p
Family structure				<0.001
Live alone	20.6	8.5	26.2	
With spouse only	25.6	42.3	17.9	
With spouse and other family members	23.5	35.2	18.1	
With other family members	30.3	4.4	37.8	
Marital status				<0.001
Married	47.9	77.6	34.1	
Widow, widower, not married, others	52.1	22.4	66.0	
Education				<0.001
None	28.8	11.5	36.8	
Elementary school graduate	37.3	29.7	40.9	
Middle school graduate	13.7	18.5	11.4	
High school graduate	14.6	26.3	9.1	
University graduate and over	5.7	14.0	1.8	
Occupation				<0.001
Administrative	1.5	3.8	0.4	
Professional	1.3	1.2	1.3	
Engineer	1.2	3.1	0.3	
Office worker	0.7	1.8	0.2	
Service worker	1.8	2.7	1.4	
Farmers, fisherman etc.	1.5	3.0	0.8	
Blue collar worker	5.1	7.4	4.1	
Unemployed	67.1	77.2	62.6	
Housewife	19.9	0.0	29.0	
Person responsible for living expenses				<0.001
Himself or herself	20.3	40.4	10.9	
Spouse	10.2	2.3	13.8	
Older adults & children	10.3	12.3	9.3	
Children	47.0	35.9	52.1	
Government support and etc.	12.3	9.2	13.8	
Economic level				NS
Very low	4.7	4.7	4.6	
Low	24.4	21.1	26.0	
Middle	64.9	67.6	63.7	
High	5.7	6.3	5.4	
Very high	0.3	0.4	0.3	
Allowances (10,000won)				<0.001
<5	14.6	10.6	16.5	
5 - 10	18.5	13.9	20.7	
10 - 20	33.7	30.8	35.0	
20 - 50	28.7	36.5	25.0	
50 and over	6.1	9.5	4.6	
Food purchase & preparation				<0.001
Himself or herself	51.8	12.7	70.0	
Spouse	20.8	63.7	0.8	
Daughter-in-law	24.1	20.4	25.8	
Daughter	2.5	1.9	2.8	
Others	0.9	1.4	0.6	

Statistical analysis by chi-square test

**Table 5.** Socio-economic characteristics of subjects by gender and age group (unit : %)

Variables	Male (yr)			p	Female (yr)			p
	50 - 64	65 - 74	75 ≤		50 - 64	65 - 74	75 ≤	
Family structure				<0.001				<0.001
Live alone	4.2	10.1	9.2		13.4	29.5	31.3	
With spouse only	19.0	54.8	39.2		24.2	19.2	8.0	
With spouse and other family members	71.0	24.4	25.4		40.1	14.5	4.3	
With other family members	5.8	10.7	26.3		22.4	36.9	56.5	
Marital status				<0.001				<0.001
Married	90.6	79.2	64.6		62.4	31.7	10.5	
Widow, widower, not married, others	9.4	20.8	35.4		37.6	68.3	89.5	
Education				<0.001				<0.001
None	4.2	4.8	28.8		14.5	33.8	67.4	
Elementary school graduate	17.8	32.5	34.6		38.3	47.7	26.6	
Middle school graduate	20.9	19.9	14.2		24.1	9.7	2.5	
High school graduate	39.3	26.2	16.3		18.8	7.5	3.2	
University graduate and over	17.8	16.8	6.2		4.3	1.3	0.3	
Occupation				<0.001				<0.001
Administrative	13.1	1.2	0.8		1.7	0.0	0.0	
Professional	3.1	0.7	0.4		1.7	0.9	2.0	
Engineer	12.6	0.5	0.0		0.7	0.2	0.0	
Office worker	6.3	0.7	0.0		0.5	0.1	0.0	
Service worker	6.8	1.0	2.5		4.1	0.8	0.0	
Farmers, fisherman etc.	1.6	3.4	3.3		0.0	1.3	0.5	
Blue collar worker	19.4	5.8	0.4		11.8	2.0	1.2	
Unemployed	37.2	86.6	92.5		33.3	67.6	80.4	
Housewife	0.0	0.0	0.0		46.3	27.1	15.9	
Person responsible for living expenses				<0.001				<0.001
Himself or herself	69.6	41.1	15.8		19.4	10.6	3.0	
Spouse	6.3	1.7	0.0		34.3	9.8	2.7	
Older adults & children	6.8	14.7	12.5		11.0	10.0	6.0	
Children	8.4	33.6	61.7		27.1	55.3	70.2	
Government support and etc.	8.9	9.0	10.0		8.2	14.4	18.2	
Economic level				0.025				<0.001
Very low	3.1	3.4	8.3		1.9	4.7	7.2	
Low	17.8	21.5	22.9		23.8	23.4	34.6	
Middle	72.3	67.4	64.2		69.7	65.4	53.2	
High	6.8	7.5	3.8		4.6	5.8	5.0	
Very high	0.0	0.2	0.8		0.0	0.6	0.0	
Allowances (10,000won)				<0.001				<0.001
<5	7.8	9.9	14.1		12.7	12.7	29.9	
5 - 10	8.3	12.6	19.9		15.8	20.0	25.4	
10 - 20	28.1	30.4	32.0		37.4	36.1	26.6	
20 - 50	39.1	38.9	28.6		28.8	26.3	15.7	
50 and over	16.7	8.2	5.4		5.3	4.9	2.5	
Food purchase & preparation				<0.001				<0.001
Himself or herself	10.5	13.8	12.5		86.8	70.2	51.9	
Spouse	83.3	66.7	42.9		0.7	1.0	0.5	
Daughter-in-law	4.7	15.9	40.4		11.0	26.3	40.2	
Daughter	0.5	2.4	2.1		1.2	2.2	5.7	
Others	1.1	1.2	2.1		0.2	0.3	1.8	

Statistical analysis by chi-square test

**Table 6.** Perceived health status of subjects by gender (unit : %)

Variables	Total (n = 2660)	Male (n = 847)	Female (n = 1813)	p
Perceived health status				<0.001
Very poor	6.0	3.8	7.2	
Poor	39.3	26.9	45.8	
Average	26.4	27.6	25.8	
Good	26.1	37.9	19.9	
Very good	2.2	3.9	1.3	
Concern for health				<0.001
Always	33.3	23.6	38.3	
Sometimes	37.0	36.4	37.4	
Don't care	23.5	29.9	20.2	
No concern	6.2	10.1	4.2	
Stress				<0.001
Never	41.5	50.9	36.7	
Little	37.8	35.4	39.1	
Moderate	17.7	12.0	20.7	
Much	3.0	1.7	3.6	
Depression				<0.001
Never	29.6	39.6	24.4	
Seldom	26.0	25.5	26.2	
Sometimes	36.4	30.9	39.2	
Always	8.1	4.0	10.2	

Statistical analysis by chi-square test

and exercise status. Dietary habits include meal frequency per day, mealtime regularity, snack frequency, frequency of eating out, behaviors such as removing fat from the meat, regular meal size, slow eating and balanced eating.

#### 4. Statistical analysis

All data were expressed as mean ± SE (standard error). Statistical analysis was performed by SAS-PC program. Statistical significance of difference was determined by ANOVA, Duncan's multiple range test, Student's t-test, and chi-square test.

## Result and Discussion

### 1. Age and gender distribution of subjects

Subjects were 2,660 adults aged 50–64yr and older adults aged 65 and over living in Korea. Males were 847 persons (32%) and females were 1813 persons (68%). They were divided into 6 groups according to age (50–64yr, 65–74yr, ≥75yr) and gender (Table 1). The percent distribution of the elderly 50–64yr, 65–74yr, 75yr and over were 23%, 53%, 24%, respectively.

**Table 7.** Perceived health status of subjects by gender and age group

(unit : %)

Variables	Male (yr)			p	Female (yr)			p
	50–64	65–74	75≤		50–64	65–74	75≤	
Perceived health status				0.038				<0.001
Very poor	1.7	3.9	5.2		6.5	5.7	11.8	
Poor	19.9	26.2	33.6		37.2	48.2	49.3	
Average	29.8	28.6	24.0		29.8	25.7	21.8	
Good	44.2	36.9	34.5		24.9	19.1	16.6	
Very good	4.4	4.4	2.6		1.6	1.4	0.6	
Concern for health				0.537				0.561
Always	20.3	24.0	25.3		35.9	39.0	39.4	
Sometimes	39.0	35.3	36.2		41.1	36.3	35.9	
Don't care	27.5	31.9	28.4		20.2	20.0	20.4	
No concern	13.2	8.8	10.0		2.9	4.7	4.3	
Stress				<0.001				<0.001
Never	36.3	50.9	62.7		29.1	38.2	41.2	
Little	37.9	37.7	29.4		47.1	38.4	31.7	
Moderate	22.5	10.0	7.0		18.6	20.4	23.6	
Much	3.3	1.5	0.9		5.2	3.0	3.5	
Depression				0.298				0.612
Never	44.0	35.7	43.0		23.0	24.8	24.8	
Seldom	23.0	28.4	22.4		24.6	26.9	26.2	
Sometimes	28.6	32.5	29.8		43.5	38.0	37.5	
Always	4.4	3.4	4.8		8.9	10.4	11.5	

Statistical analysis by chi-square test

## 2. Anthropometric data of subjects

The mean age of males and females were 69.3 and 69.0 years, respectively (Table 2). The mean weight and height for males and females were  $63.8 \pm 0.3\text{kg}/164.0 \pm 0.2\text{cm}$  and  $57.0 \pm 0.2\text{kg}/150.6 \pm 0.1\text{cm}$ , respectively. BMI (body mass index), body fat, and percent fat were significantly greater in females than males ( $p < 0.0001$ ). The muscle mass and body water were significantly greater in male than females ( $p < 0.0001$ ).

As shown in Table 3, there was a significant age effect in height, weight, BMI, muscle mass, body fat, and body water ( $p < 0.0001$ ). While a steady decrease in height, weight, BMI, muscle mass, and body water was evident both in males and females, body fat gradually decreased with age in female subjects only. Male subjects aged 75 and over and female subjects aged 65 – 74 showed the highest percent fat.

Increased fat percent and high BMI are related to a high risk of diabetes, hypertension, and CHD (coronary heart disease). Therefore, it is recommended that the older adults reduce their body fat distribution and BMI by regular exercise and balanced diet (Hu et al. 2001).

Simple anthropometric measurements can provide practical and valid indices of nutritional status. It is important to assess nutritional status of the elderly because they are at high risk of malnutrition (Bannerman et al. 1997).

The combination of percent weight loss, body mass index and serum albumin level was associated with an 80% prevalence of malnutrition among elderly people admitted for acute care (Azad et al. 1999). Low body mass index in old age is associated with an increased risk of morbidity and mortality (McCormack 1997).

## 3. Socio-economic characteristics of subjects

Twenty-one percent of total subjects live alone and 26% with spouse only (Table 4). According to the statistics of MOHW (Ministry of Health and Welfare, 2000), the proportion of the elderly living alone was 16.2% of total household with the elderly and that of the elderly living with spouse only was 28.7%. Kim et al. (2001) revealed that living arrangements considerably affect nutritional status of the aged Koreans. The elderly living alone are vulnerable to malnutrition.

The proportion of female subjects living alone was higher than that of male subjects. In marital status, 66% of female subjects were widowed or not married. Education levels and occupation patterns were significantly different between males and females. Forty-one percent of males and 78% of females were elementary school graduate or illiterate. Most of subjects were in middle economic level (65%) or low level (24%) by self-report. Allowances of the elderly were significantly lower in females than males ( $p < 0.001$ ).

**Table 8.** Lifestyle of the subjects by gender (unit : %)

Variables	Total (n=2660)	Male (n=847)	Female (n=1813)	p
Cigarette smoking				<0.001
Smoker	16.6	38.4	6.5	
Non-smoker	74.9	39.6	91.4	
Ex-smoker	8.5	22.0	2.2	
Alcohol drinking				<0.001
Drinker	28.3	51.3	17.6	
Non-drinker	67.0	36.6	81.2	
Ex-drinker	4.7	12.1	1.2	
Exercise				
Yes	45.0	54.0	40.9	
No	55.0	46.0	59.1	

Statistical analysis by chi-square test

**Table 9.** Lifestyle of the subjects by gender and age group (unit : %)

Variables	Male (yr)			p	Female (yr)			p
	50 – 64	65 – 74	75 ≤		50 – 64	65 – 74	75 ≤	
Cigarette smoking				0.195				<0.001
Smoker	45.8	37.0	35.0		3.1	5.2	12.9	
Non-smoker	34.9	39.1	44.2		96.6	92.2	84.1	
Ex-smoker	19.3	23.9	20.8		0.3	2.6	3.0	
Alcohol drinking				<0.001				0.509
Drinker	66.7	47.8	45.0		19.2	16.7	17.9	
Non-drinker	25.5	39.6	40.4		79.4	82.4	80.4	
Ex-drinker	7.8	6.2	14.6		1.4	0.9	1.7	
Exercise				<0.001				<0.001
Yes	47.6	62.2	45.0		38.6	47.3	27.2	
No	52.4	37.8	55.0		61.4	52.7	72.8	

Statistical analysis by chi-square test

The 75yr and over subjects, lower the education levels, allowances, and economic levels in both males and females (Table 5). No occupation, low allowances and low economic levels were associated with inadequate nutrient intakes and health status in the elderly. In general, economic factors affect the subjective satisfaction on living and health status (Kim 2000).

**4. Perceived health status**

Thirty percent of the male subjects and 53% of the female subjects answered their health status very poor or poor (Table 6). Females (38.3%) had more concern on their health than males (23.6%). Similar trends were seen for stress and depression also.

Proportion of subjects answered ‘very poor’ or ‘poor’ on perceived health status was higher in older group (Table 7). The 50~64yr old group was facing with more stress than the group aged over 65. Concern for health and self-reported depression were not significantly different by age.

**5. Life style of subjects**

Among male subjects, 38.4% were current-smokers and 22.0% were ex-smokers. But only 6.5% of female subjects were current-smokers (Table 8). As can be seen in Table 9, number of male smokers decreased with age (from 46% to 35%). Meanwhile, females were smoking more as they got older (from 3% to 13%). Current smokers are enjoying alcohol drinking, salty or spicy food, and they tend to have irregular meals, insufficient sleep time, and inactive lifestyle compared to non-smokers. Smokers consumed fewer servings of vegetables, fruits, and soybean and their products (Joung 1999).

Males are significantly higher than females in the proportion of alcohol drinker. Fifty-four percent of males and 41% of females were exercising regularly. Regularity of exercise was positively related with cognitive function (Kim 1998). Percentage of the elderly with regular exercise was the highest in the group of 65 – 74 years both in males and females.

**6. Dietary habits of subjects**

Males turned out to have better dietary habits-meal frequency per day, mealtime regularity, regular meal size and balanced eating-than females (p<0.001) (Table 10). However, in terms of behaviors such as removing fat of meat and frequency of eating out, females showed better habits than males (p<0.001).

In snacking frequency, 50 – 64 years female subjects had more frequent snack than 65yr and older. The proportion of the elderly eating meals slowly was increased with

**Table 10.** Dietary habits of the subjects by gender (unit : %)

Variables	Total (n=2660)	Male (n=847)	Female (n=1813)	p
Meal frequency (times/d)				<0.001
1	0.3	0.5	0.3	
2	11.7	6.6	14.1	
3	87.6	92.4	85.4	
4 and over	0.3	0.5	0.3	
Meal time regularity				<0.001
Always	37.2	44.3	33.9	
Often	37.0	36.9	37.0	
Moderate	7.0	5.6	7.6	
A little	17.2	12.3	19.5	
Not at all	1.7	1.0	2.0	
Snack frequency (times/d)				<0.001
> = 3	4.1	4.4	3.9	
1 – 2	30.3	22.3	34.0	
< 1	26.1	26.3	26.0	
None	39.5	47.1	36.0	
Frequency of eating-out				<0.001
> 1 time/day	7.9	15.5	4.4	
> 1 time/week	14.9	20.2	12.4	
> 1 time/month	25.2	22.8	26.3	
None	52.0	41.5	56.9	
Trim fat from meat				<0.001
No	29.1	51.1	18.9	
Trim roughly	20.8	17.2	22.5	
Trim almost	35.8	23.2	41.6	
Not eat fat	14.4	8.5	17.1	
Regular meal size				<0.001
Always	53.4	60.6	49.7	
Often	32.9	29.6	34.5	
Moderate	6.5	4.5	7.6	
A little	6.6	5.0	7.4	
Not at all	0.6	0.2	0.8	
Eat slowly				NS
Always	27.5	28.8	26.8	
Often	21.2	21.6	20.9	
Moderate	18.7	20.5	17.8	
A little	24.4	22.2	25.5	
Not at all	8.2	7.0	8.9	
Balance eating				<0.001
Always	35.6	44.3	31.1	
Often	31.7	30.5	32.3	
Moderate	10.9	10.0	11.4	
A little	17.8	12.4	20.7	
Not at all	3.9	2.8	4.5	

Statistical analysis by chi-square test

age (Table 11). In male, 33% of 50 – 64 years subjects answered ‘always’ or ‘often’ eat slowly, but about 50% of 65 years and over answered the same. Female subjects showed

the similar result.

Dietary habits are also closely related with health of the elderly. Kim et al. (1999) reported that the eating pattern of

**Table 11.** Dietary habits of the subjects by gender and age group (unit : %)

Variables	Male (yr)			p	Female (yr)			p
	50 – 64	65 – 74	75 ≤		50 – 64	65 – 74	75 ≤	
Meal frequency (times/d)				0.060				0.051
1	0.0	0.5	0.8		0.2	0.2	0.5	
2	11.5	5.3	5.0		17.0	14.2	10.7	
3	88.5	93.2	94.2		82.0	85.4	88.8	
4 and over	0.0	1.0	0.0		0.8	0.2	0.0	
Meal time regularity				0.019				0.712
Always	38.5	45.2	47.3		32.9	34.5	33.5	
Often	39.1	37.2	34.7		36.5	36.6	38.5	
Moderate	4.2	4.6	8.4		9.1	6.8	8.3	
A little	18.2	11.6	8.8		20.1	20.1	17.3	
Not at all	0.0	1.5	0.8		1.4	2.0	2.5	
Snack frequency (times/d)				0.518				<0.001
> = 3	3.1	5.3	3.8		5.8	3.6	2.7	
1 – 2	25.5	22.7	18.8		37.9	36.1	24.9	
< 1	24.5	26.8	26.8		26.3	25.1	27.9	
None	46.9	45.2	50.6		30.0	35.2	44.4	
Frequency of eating-out				<0.001				<0.001
> 1 time/day	29.2	13.0	8.8		4.3	4.0	5.2	
> 1 time/week	20.3	22.2	16.7		13.9	13.8	7.2	
> 1 time/month	16.2	24.9	24.6		28.4	28.9	18.0	
None	34.4	39.9	50.0		53.5	53.3	69.6	
Trim fat from meat				0.046				<0.001
No	57.1	48.1	28.5		15.6	17.2	26.3	
Trim roughly	17.8	17.4	26.9		25.7	22.3	19.5	
Trim almost	16.8	27.5	20.9		41.6	45.2	32.8	
Not eat fat	8.4	7.0	11.3		17.1	15.3	21.5	
Regular meal size				0.054				0.133
Always	53.3	62.4	63.3		47.1	51.8	47.6	
Often	34.1	29.1	27.1		34.5	33.6	36.9	
Moderate	3.9	4.2	5.7		6.6	7.6	8.7	
A little	7.7	4.4	3.9		11.1	6.3	6.3	
Not at all	1.1	0.0	0.0		0.8	0.8	0.6	
Eat slowly				<0.001				<0.001
Always	17.6	30.3	34.9		21.3	27.9	30.3	
Often	15.4	21.5	26.6		16.6	21.1	25.4	
Moderate	24.2	18.8	20.5		18.7	17.0	19.0	
A little	36.3	21.0	13.1		34.5	23.9	19.6	
Not at all	6.6	8.3	4.8		9.0	10.1	5.8	
Balance eating				0.800				<0.001
Always	44.0	45.2	42.8		34.2	33.5	21.9	
Often	30.8	31.1	29.3		34.5	30.6	34.3	
Moderate	7.7	9.5	12.7		7.9	10.4	17.6	
A little	14.3	11.3	13.1		19.2	20.9	21.6	
Not at all	3.3	2.9	2.2		4.2	4.6	4.6	

Statistical analysis by chi-square test



long living was characterized by regularity and simplicity of meal, and not overeating.

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## Summary and Conclusion

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The purpose of this study was to assess diet and health-related factors of the elderly. The mean age of males and females were 69.3 years and 69.0 years, respectively (Table 2). The mean weight and height for males and females were  $63.8 \pm 0.3\text{kg} / 164.0 \pm 0.2\text{cm}$  and  $57.0 \pm 0.2\text{kg} / 150.6 \pm 0.1\text{cm}$  respectively.

Twenty-one percent of total subjects lived alone and 26% of them lived with spouse only. The proportion of female subjects living alone was higher than that of male subjects. Females (38.3%) had more concern on their health than males (23.6%). The 50 – 64yr old group was facing with more stress than 65yr and over group.

Among male subjects, 38.4% were current-smokers and 22.0% were ex-smokers. But only 6.5% of female subjects were current-smokers. Elderly smokers tended to have less healthy life style, food habit, and dietary nutrient intakes which may influence the deleterious effects of smoke components on cancer and coronary heart disease risk, thus education program should include nutrition education as well as smoking cessation (Jonung 1999).

Males turned out to have better dietary habits-meal frequency per day, mealtime regularity, regular meal size and balanced eating-than females ( $p < 0.0001$ ).

A comprehensive screening tool for assessment of nutritional status is needed and it should be clinically relevant and cost-effective to perform. Early identification through screening, assessment and intervention will improve the nutritional state of all elderly (Lee et al. 2002 ; Vellas et al. 2001).

In conclusion, simple assessment tools on health and nutrition status are necessary to manage and prevent malnutrition of the aged people in Korea.

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