

Relationship of Socioeconomic Status and Food Intake to Cognitive Status of the Older Population

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ABSTRACT

This study was done to investigate the relationship of socioeconomic status and food intake to cognitive status of the older population. The subjects of this study consisted of 214 older persons aged 60 – 84 years. Interviews were conducted using the health-related habits and food frequency questionnaires to provide basic information for nutrition education program. We evaluated the current food consumption pattern and cognitive status of the subjects. The results of this study were as follows : Mean age of the subjects was 69.7 ± 7.4 years. The average cognitive function score of the subjects was 7.9 ± 2.0 (full score was 10.0). Male had a higher cognitive status score than female. There was significant difference between cognitive status score and age, education level, pocket money, physical activity and family type. The subjects who had a higher cognitive status score ate more fish and meats group and milk and milk products than the subjects that had a lower cognitive status score. These results have demonstrated that various socioeconomic variables and food intake pattern affect on cognitive status with aging and suggest that proper nutrition education and adequate nutrient intake in quality and quantity are essential in maintaining cognitive status in later life. (*J Community Nutrition* 5(3) : 173~177, 2003)

KEY WORDS : socioeconomic status · food intake · cognitive status · older population.

Introduction

Older people comprise a significant and increasing percentage of the population living in Korea. According to the statistics by the Ministry of Health and Welfare in the year 2000, the percentage of the population over 65 years old was 6.6% in 1998, and is expected to rise to 9.9% in 2010, and 13.2% in 2020 (Statistics 2000).

Our increasingly older and aging population experiences a variety of nutritional problems and needs. These problems result from many diverse environmental, social and economic factors and they are compounded by numerous physiologic changes that occur at different rates as individual age (Han 1999 ; Kim et al. 2000).

Furthermore mental health plays a significant role in the motivation and capacity of older persons to meet nutritional

needs. This is true for the active older adult challenged by health and life style change related to aging (ADA 2000 ; Schlenker 1993). Just as change in overall functional level can indicate a number of disease processes with diminished and/or changed cognitive status.

“Cognitive status means” the individual’s capability of intellectual brain function, including such testable areas as memory, language, math, abstraction, orientation to time, place and person, writing, reading and other aspects. Whereas dementia (the major cause of overall cognitive function) is clearly an important risk factor for the development of poor nutritional status, poor nutrition can itself contribute to the effects of the syndrome (psychosocial changes, weight change, anorexia, dyspepsia, constipation, diarrhea etc.), and mild cognitive deficits have been demonstrated to be caused by poor nutrition (Dwyer 1991).

Mental health condition of the elderly as measured by cognitive function and the degree of depression was also inadequate and had strong association with dietary consumption. The positive results were obtained in individuals having an adequate diet (Lee 2002). Among various factors that most influenced on cognitive function were education level and

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riboflavin intake. The subjects of higher education level had significantly higher cognitive function scores than those with no school education, nutrient intake was positively related to cognitive function (Kim et al. 1998).

Thus the purpose of this study was to investigate the variables which are related to cognitive function of the older population in the Ulsan area. The relationship between cognitive function and socioeconomic status and food intake pattern was described in this study in order to provide basic data for the proper nutrition education program and establishing dietary guidelines for the older population.

Subjects and Method

1. Subjects

The total number of subjects was 214 older persons aged 60 – 84 years who live in the Ulsan area. They were recruited from health and community centers.

Trained interviewers asked participants about their general condition (age, income, education level, family type) as well as questions related to the health and food intake pattern and cognitive status. The survey was carried out from August to

December 2002.

2. Food intake

To assess the food intake status of the subjects, a questionnaire was used which was developed from a prior study (Lee, Kim 2002). Questions on food groups eaten at every meal were asked based on five points : 5 = almost every day, 4 = often (≥ 4 times a week), 3 = sometimes (2 – 3 times a week), 2 = seldom (≤ 1 time a week), 1 = almost never, by frequencies and the total score was named “food intake score”. Food groups were classified into five categories ; cereals & grain products, meats, fish, eggs & bean, fruits & vegetables, milk & milk products, fats, oils & sweets.

3. Cognitive status

Cognitive status of subjects was measured by SPMSQ (Short Portable Mental Status Questionnaire : Eric 1975) which consisted of ten statements related to mental status. Full score was 10 points, if the subjects took the score 7 and lower 7 points, we regarded as suspected means the individuals who have cognitive impairments characteristic of dementia. The subjects were divided into two groups by their cognitive status scores, one was the normal group and the other group was suspected group.

Table 1. Socioeconomic characteristics of the subjects

Variables	Male (N = 74)	Female (N = 140)	Total (N = 214)	Significance*	N(%)	
Age (yr)	< 65	28 (37.8)	41 (29.3)	69 (32.2)	NS	
	65 – 74	32 (43.2)	78 (55.7)	110 (51.4)		
	≥ 75	14 (19.0)	21 (15.0)	35 (16.4)		
Education level	No school	14 (19.0)	70 (50.0)	84 (39.3)	p < 0.001	
	Primary school	27 (36.5)	50 (35.7)	77 (40.0)		
	Middle school	19 (25.6)	16 (11.4)	35 (16.3)		
	\geq High school	14 (18.9)	4 (2.9)	18 (8.4)		
Family type	Alone	5 (6.8)	24 (17.1)	29 (13.5)	p < 0.001	
	w/spouse	30 (40.5)	32 (22.8)	62 (29.0)		
	w/children	7 (9.5)	52 (37.2)	9 (27.6)		
	Expanded	28 (37.8)	25 (17.9)	53 (24.8)		
	Others	4 (5.4)	7 (5.0)	11 (5.1)		
Pocket money (won/mon.)	< 50,000	17 (23.0)	50 (35.7)	67 (31.3)	NS	
	50,000 – 99,999	23 (31.1)	49 (35.0)	72 (33.6)		
	100,000 – 199,999	21 (28.4)	26 (18.6)	47 (22.0)		
	$\geq 200,000$	13 (17.5)	15 (10.7)	28 (13.1)		
Physical activity	Sedentary	27 (36.5)	42 (30.3)	69 (32.2)	NS	
	Moderate	35 (47.3)	73 (52.1)	108 (50.5)		
	Active	12 (16.2)	25 (17.9)	37 (17.3)		
Total	74 (100.0)	140 (100.0)	214 (100.0)			

*Significance of F value by one-way ANOVA

4. Statistical analysis

The statistical analysis was conducted using SPSS 10.0 program. Measurements were expressed as averages, standard deviations, and percentages. Student's t-test, ANOVA and chi-square test were used to determine statistical significance.

Results and Discussions

1. Socioeconomic status

Data on general information on 214 older persons are presented in Table 1. The subjects aged from 60 to 84 years, and average age of the subjects was 69.7 ± 7.4 years. Male subjects generally achieved a higher education level than female ; 44.5% of men completed middle/high school, compared to only 14.3% for women, showing significant differences between the sexes. As for monthly available pocket money, 31.1% of men were in the range of 50,000 to 99,999 won, and 35.7% of women were in the range of less than 50,000 won. The education levels of the subjects in this study were lower than those surveyed in Jeonju (Yu, Kim 2002), but the female subjects of the present study had higher levels of education than that of those older women surveyed in Ulsan (kim 2001).

Older people who live alone may have physical or mental limitations that make food preparation difficult if not impossible. 17.1% of female subjects were living alone, com-

Table 2. Food consumption score by sex

Food group	Male (N = 74)	Female (N = 140)	Total (N = 214)
Cereals & grain products	4.6 ± 0.6 ¹⁾	4.8 ± 0.5	4.8 ± 0.4
Meats, fish, eggs, bean	3.2 ± 1.2	2.9 ± 1.1	3.0 ± 1.1
Fruits & vegetables	4.2 ± 1.0	4.5 ± 0.8	4.4 ± 0.9
Milk & milk products	2.8 ± 1.3	2.7 ± 1.4	2.7 ± 1.5
Fats, oils & sweets	1.8 ± 0.8	1.7 ± 0.7	1.8 ± 0.9

1) Mean ± S.D.
Numerical scale means the frequency of eaten food group at every meal
5 = almost every day, 4 = often (≥ 4times a week), 3 = sometimes (2 – 3times a week), 2 = seldom (≤ 1time a week)

Table 3. Food consumption score by age

Food group	< 65(N = 69)	65 – 74(N = 110)	≥ 75(N = 35)	Total(N = 214)
Cereals & grain products	4.8 ± 0.5 ¹⁾	4.9 ± 0.4	4.9 ± 0.3	4.8 ± 0.4
Meats, fish, eggs, bean	3.0 ± 1.1	2.8 ± 1.1	2.9 ± 1.0	3.0 ± 1.1
Fruits & vegetables	4.7 ± 0.7	4.3 ± 0.9	4.1 ± 1.0	4.4 ± 0.9*
Milk & milk products	2.7 ± 1.4	2.6 ± 1.2	2.5 ± 1.5	2.6 ± 1.3
Fats, oils & sweets	1.6 ± 0.7	1.8 ± 0.8	1.9 ± 0.7	1.8 ± 0.9

1) Mean ± S.D., * : p < 0.005 by F test

pared to only 6.8% for male subjects, showing significant differences between the sexes. Kim et al. (2001) revealed that living arrangements considerably affect nutritional status of the aged Koreans. The elderly living alone are vulnerable to malnutrition.

2. Food intake

Table 2 shows food intake score by sex. Both male and female subjects were taking highest score in the cereals/grain products among the five food groups, female subjects had a slightly higher score than that of male subjects. In the meat/poultry/fish/eggs and milk or milk products, male subjects had higher scores than that of female subjects, but in the fruits and vegetable group, female subjects had a higher score than that of male subjects, not showing significant difference between the sexes. Nutrient intake of females were lower than those of males. There was a significant gender difference in nutrient intakes (Ro et al. 2003).

As shown in Table 3, there was a significant difference in food consumption score of fruits and vegetables by age group. Getting older, they ate less fruits and vegetables, it might be due to sour taste and texture of fruits and vegetables.

3. Cognitive status

Mental health condition of the elderly as measured by cognitive function and the degree of depression was also inadequate and had strong association with dietary consumption. The average cognitive status score of total subjects was 7.9 ± 2.0 (full score was 10.0). As shown in Table 4, average cognitive score of male subjects was significantly

Table 4. Cognitive score by sex and age

Variables	Male (N = 74)	Female (N = 140)	Significance
< 65	9.6 ± 1.2 ¹⁾	8.0 ± 1.3	
Age (yr)			p < 0.05
65 – 74	8.9 ± 1.8	7.8 ± 1.4	
≥ 75	7.5 ± 1.6	6.4 ± 2.2	
Total	9.0 ± 1.3	7.4 ± 2.1	p < 0.001

1) Mean ± S.D.

Table 5. Factors to influence on cognitive status

Variables		Suspected* (N = 80)	Normal (N = 134)	Total (N = 214)	N(%)	Significance
Sex	Male	12 (15.0)	62 (46.3)	74 (34.6)		p < 0.001
	Female	68 (85.0)	72 (53.7)	140 (65.4)		
Age (yr)	< 65	15 (18.8)	54 (40.3)	69 (32.2)		p < 0.001
	65 – 74	41 (51.2)	69 (51.5)	110 (51.4)		
	≥ 75	24 (30.0)	11 (8.2)	35 (16.4)		
Education level	No school	52 (65.0)	32 (23.9)	84 (39.2)		p < 0.001
	Primary school	20 (25.0)	57 (42.5)	77 (36.0)		
	Middle school	6 (7.5)	30 (22.4)	36 (16.8)		
	≥ High school	2 (2.5)	15 (11.2)	17 (8.0)		
Family type	Alone	18 (22.5)	11 (8.2)	29 (13.5)		p < 0.001
	w/spouse	13 (16.2)	49 (36.6)	62 (29.0)		
	w/children	38 (47.5)	21 (15.7)	59 (27.6)		
	Expanded	8 (10.0)	46 (34.3)	54 (25.2)		
	Others	3 (3.8)	7 (5.2)	10 (4.7)		
Pocket money (won/month)	< 50,000	35 (43.8)	32 (23.9)	67 (31.3)		p < 0.01
	50,000 – 99,999	29 (36.2)	43 (32.1)	72 (33.6)		
	100,000 – 199,99	11 (13.7)	44 (32.8)	55 (25.7)		
	≥ 200,000	5 (6.3)	15 (11.2)	20 (9.4)		
Social activity	Yes	39 (48.8)	113 (84.3)	152 (71.0)		p < 0.05
	No	41 (51.2)	21 (15.7)	62 (29.0)		
Physical activity	Sedentary	32 (40.0)	37 (27.6)	69 (32.2)		p < 0.05
	Moderate	28 (35.0)	80 (59.7)	108 (50.5)		
	Active	20 (25.0)	17 (12.7)	37 (17.3)		

*suspected : means the individuals who have cognitive impairments characteristic of dementia (cognitive score was 7 and lower 7 points)

higher than that of female subjects ($p < 0.001$). And the 75 year and over subjects had a lower cognitive score compared to other age groups ($p < 0.05$). It might reveal that older female subjects are more vulnerable to mental impairment than other groups. For those surveyed in Seoul (Kim et al. 1998), the results were similar to those obtained in the present study : according to the MMSE-K score, cognitive function status of women is more inadequate or poor than that of men.

4. Food consumption and cognitive status

The subjects who had a higher cognitive status score ate more meat/poultry/fish/eggs and milk or milk products than the subjects had a lower cognitive status score (Table 5). According to the survey of Lee (2002), the physical as well as mental health in elderly Koreans is highly related with their dietary patterns. Thus, the older adults need to consume nutritionally well balanced diets in sufficient amount, which contains various food items, including significant amounts of animal source foods in a daily diet in order to maintain healthy conditions. Kim et al. (1998) revealed that cognitive

Table 6. Food consumption score by cognitive status

Food group	Suspected (N = 80)	Normal (N = 134)	Total (N = 214)
Cereals & grain products	4.8 ± 0.5 ¹⁾	4.8 ± 0.4	4.8 ± 0.4
Meats, fish, eggs, bean	2.8 ± 1.0	3.1 ± 1.1	3.0 ± 1.1
Fruits & vegetables	4.4 ± 0.9	4.5 ± 0.7	4.4 ± 1.0
Milk & milk products	2.5 ± 1.3	2.7 ± 1.3	2.6 ± 1.3
Fats, oils & sweets	1.9 ± 1.1	1.8 ± 0.8	1.8 ± 0.9

1) Mean ± S.D.

function score had a strong relationship with food intake such as total amounts of foods, fish and shellfish, milk and dairy products, total animal food, fruit, bread and sugar. Energy, protein, Ca, P, riboflavin, and niacin were also shown to have positive relationships to cognitive function scores, while carbohydrate caloric ratio had a negative relationship with cognitive function.

5. Socioeconomic status and cognitive function

Table 6 shows the relationship between various socioeconomic variables and cognitive status ; there were significant

differences between cognitive status and sex, age, education level, income, physical activity and family type. Men had a higher cognitive status score than that of women. Cognitive status score was positively related to education level, pocket money and physical activity, but the older group and who are living alone had a lower cognitive status score than others. This present study had similar results compared to those surveyed in Seoul ; cognitive function score was positively related to education level and regularity of exercise. Chyou et al. (1996) revealed that physical activity considerably affects cognitive status of the aged Japanese living in America.

Summary and Conclusion

The purpose of this study was to investigate the variables which are related to cognitive status. The relationships between cognitive status and socioeconomic status and food intake pattern were described in this study. The subjects were aged from 60 to 84 years, and the mean age of the subjects was 69.7 ± 7.4 years. Male subjects generally achieved a higher education level than female. 17.1% of female subjects were living alone, the proportion of female subjects living alone was higher than that of male subjects (6.8%).

Both male and female subjects were taking highest scores in cereals and grain products among the five food groups. In the animal foods group, male subjects had higher scores than those of female subjects, while in the fruit and vegetable group, female subjects had a higher score than that of male subjects.

The average cognitive status score of subjects was 7.9 ± 2.0 (full score was 10.0). Average cognitive score of male subjects was significantly higher than that of female subjects ($p < 0.001$). And the 75 year and over subjects had a lower cognitive score compare to other age group ($p < 0.05$).

The subjects who had a higher cognitive status score ate more in the animal foods group than the subjects who had a lower cognitive status score. Men had a higher cognitive status score than that of women. Cognitive status score was positively related to education level, pocket money and physical activity ; the older group and who are living alone had a lower cognitive status score than others.

These results have demonstrated that various socioeconomic variables and food intake patterns affect on cognitive status with aging and suggest that proper nutrition education and adequate nutrient intake in quality are essential in ma-

intaining cognitive status in later life. And also health professionals, older people and their families, as well as the larger community, can join together as partners to focus on the promotion of quality of life as well as health and optimal functioning, prevention of nutritional risks and the amelioration of malnutrition when it is inevitable.

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