

## Comparison of Dietary Habits According to Depression and Stress in the Elderly

Jean Kyung Paik<sup>1</sup>, Jung Hyun Kwak<sup>1</sup>, Hye-Jin Park<sup>2</sup>, Myung-chul Kim<sup>3</sup>, Il-Hoon Cho<sup>4</sup>, Hang-Sik Park\*<sup>5</sup>

<sup>1</sup>Professor, Dept. of Food & Nutrition, Eulji University, 13135, Korea

<sup>2</sup>Master's student, Dept. of Food & Nutrition, Eulji University, 13135, Korea

<sup>3</sup>Professor, Dept. of Physical Therapy, Eulji University, 13135, Korea

<sup>4</sup>Professor, Dept. of Biomedical Laboratory Science, Eulji University, 13135, Korea

\*<sup>5</sup>Professor, Faculty of Liberal Arts, Eulji University, 13135, Korea

### ABSTRACT

The maintaining good nutritional status in elderly is very important for healthy aging. The purpose of this study is to provide data on the health care and intake of nutrition by comparing dietary habits in elderly according to depression and stress status. This study obtained from database of the 6<sup>th</sup> Korean National Health and Nutrition Examination Survey (KNHANES, 2013-2015). This study used 1,920 elderly over 65 years. Statistical analyses were performed by using SPSS program. In the analysis, continuous variables were expressed as mean and standard error, and categorical variables were expressed as percentages (%). Then, we evaluated the survey using a general linear model (GLM), and Rao-Scott  $\chi^2$  test. In dietary habits, the proportion of those who answered "Skipping a meal more than twice a week" in the evening and the proportion of those who answered "Eat enough food but did not eat a variety of food" were higher in subjects with depression and stress (DS) than in subjects without depression and stress (NDS). In parameter of nutritional quality, the INQ values of protein, niacin, calcium, and phosphorus in the subjects with DS were significantly lower than in the subjects with NDS. DS groups showed poorer dietary habits and nutrition quality than the NDS groups.

**Keywords:** Depression, Stress, Elderly, Nutrition, KNHANES.

\*Corresponding Author :

Name : Hang-Sik Park

Email : parkhs@eulji.ac.kr

Contact : +82-010-5243-7624

Fax : +82-31-740-7370

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## **Introduction**

The Korean National Statistical Office reported the population ratio of South Koreans aged 65 or older is expected to rise from 14.9 percent in 2019 to 46.5 percent in 2067 (Statistics Korea, 2019) The bad nutritional status is associated with decreased immune system particularly in elderly (Pae M *et al.*, 2017). Therefore, maintaining good nutritional status in elderly is very important for healthy aging (Marsman D *et al.*, 2018). Depression and stress have been reported to affect eating habits and nutritional intake in the older adults. Elderly with depressive symptoms tend to lose their appetite, and made unhealthy food choices (Lee S *et al.*, 2014). In addition, stress affect dietary patterns. In the other study, the higher psychological stress have been associated with more preferences increased consumption of unhealthy food such as snack-type foods, and decreased consumption of healthy food such as meal-type foods (Kandiah J *et al.*, 2006). Therefore, the purpose of this study is to provide data on the health care and intake of nutrition by comparing dietary habits in elderly according to depression and stress.

## **Materials and Methods**

### **Study design**

This study used the data from the 2013-2015 survey among the KNHANES. The KNANES was designed to extract representative samples of citizens over the age of 1 residing in Korea, and data were collected through a household member identification survey, health questionnaire, medical examination, and nutrition survey. The subject's survey content differed according to age.

### **Participants**

This study used 1,920 elderly over 65 years participated data from the 6th KNHANES. The criteria for subjects were as follows the question. ‘During the last year, have you ever felt sad or desperate enough to interfere with your daily activities for more than two consecutive weeks?’, and ‘How much stress do you feel in your daily life?’. The DS group (n=188) included those who answered, “a lot” or “Yes”. The NDS group (n=1,732) included those who answered ‘rarely’ or ‘No’. Consent was obtained for the participants of this study, and this research data is public data, and the contents of research progress and questionnaire items, variables and data can be accessed and used anywhere.

### **Sociodemographic characteristics**

In general characteristics, age, height, weight, frequency of alcohol consumption, and

smoking status were obtained from the health examination survey. Smoking was categorized as non-smoker, ex-smoker and current smoker. The frequency of alcohol intake was classified as never,  $\leq$  once a month, 1-4 times/month, and  $\geq$  2 times/week.

### Index of nutritional quality (INQ)

The INQ of each nutrient was calculated according to the formulae:  $INQ = \text{intake amount of a nutrient (per 1000 kcal)} / \text{the recommended Dietary Allowance (per 1000 kcal) or adequate intake (per 1000 kcal)}$  (Lim H *et al.*, 2012). If INQ is higher than 1.0, the nutrition is higher than the recommended intake, so the quality of the meal is higher. If it is less than 1.0, the quality of meal is lower than the recommended intake.

### Statistical analysis

In the analysis, continuous variables were expressed as mean and standard error, and categorical variables were expressed as percentages (%). Then, we evaluated the survey using a general linear model (GLM) and Rao-Scott  $\chi^2$  test.

All statistical processing was performed with SPSS (ver. 20.0).

## Results and Discussion

Table 1 presents the general characteristics. The mean ages of in the subjects with DS, and the subjects with NDS were 72.7, and 72.4 years, respectively. The BMI of in the subjects with DS, and the subjects with NDS were 24.34, and 24.10  $\text{kg/m}^2$ , respectively. Both groups, the proportion was higher for nonsmoker. For alcohol consumption, the percentages (%) of non-drinker in the subjects with DS was higher, and the proportion of who drank at least once a month in NDS group was higher.

**Table 1: General characteristics**

	Total (n=1,920)		p-value
	DS (n=188)	NDS (n=1,732)	
Age(years)	72.7 $\pm$ 0.40	72.4 $\pm$ 0.14	0.470
BMI( $\text{kg/m}^2$ )	24.34 $\pm$ 0.30	24.10 $\pm$ 0.09	0.445
Smoking status <sup>§</sup>			<0.001
Current smoker	20(7.7)	174(9.9)	
Ex-smoker	31(15.5)	529(31.0)	
Nonsmoker	136(76.8)	1,027(59.1)	
Alcohol consumption			<0.001

Never	73(44.1)	459(25.7)
< 1 time(per month)	82(40.6)	745(43.1)
1~4 time(per month)	13(6.5)	230(13.4)
≥ 2 time(per weeks)	20(8.8)	298(17.8)

Tested by a survey GLM and survey Rao-Scott  $\chi^2$  test.

<sup>§</sup>One in the DS and 2 in the NDS group were excluded because they did not respond.

Table 2 shows the characteristic of biochemical factors. Triglyceride tended to be higher in the subjects with DS than in the subjects with NDS (Table 2).

**Table 2: Characteristics of biochemical factors**

	Total (n=1,920)		p-value
	DS (n=188)	NDS (n=1,732)	
Triglyceride (mg/dL)	151.34±10.19	134.04±2.34	0.091
Total- Cholesterol (mg/dL)	192.87±4.22	186.49±1.11	0.137
HDL- Cholesterol (mg/dL)	49.92±1.45	47.82±0.37	0.164
LDL- Cholesterol (mg/dL)	112.68±3.55	111.86±1.03	0.817

Tested by a survey GLM for continuous variables.

Table 3 shows the characteristic of dietary habits. In dietary habits, the proportion of those who answered “Skipping a meal more than twice a week ” in the evening and the proportion of those who answered “Eat enough food but did not eat a variety of food” were significantly higher in the subjects with DS then in the subjects with NDS (Table 3). In summary, in the subjects with DS showed poorer dietary habits than the subject with NDS. Psychological stress suggested a potential risk factor for depression in the elderly (Cho H S *et al.*, 1997). Furman et al, reported that nutritional problems are also likely to occur when subjects are depressed or under psychological stress (Furman E F., 2006). For the elderly, nutrition problems are not just about nutritional imbalances, but are associated with increased mortality (Hsu Y H *et al.*, 2019). Therefore, it is very important for healthy aging to identify and prevent any nutritional and dietary problems in subjects with depression or stress.

**Table 3: Characteristics of dietary habits**

	Total (n=1,920)		p-value
	DS (n=188)	NDS (n=1,732)	
Skipping a meal			0.508
Breakfast			
≤ 0~2/weeks	176(93.7)	1,657(96.0)	
> 2~7/weeks	12(6.3)	64(4.0)	
Lunch			0.208
≤ 0~2/weeks	174(94.4)	1,656(96.2)	
> 2~7/weeks	14(5.6)	65(3.8)	
Dinner			<0.001
≤ 0~2/weeks	181(96.5)	1,705(99.1)	
> 2~7/weeks	7(3.5)	16(0.9)	
Status of eating habits <sup>§</sup>			<0.001
Eat enough quantity and variety of food	52(30.0)	833(48.9)	
Eat enough food but did not eat a variety of food	91(51.4)	775(45.4)	
Economically difficult times was no enough eat	42(18.6)	103(5.7)	

Tested by a survey Rao-Scott  $\chi^2$  test

<sup>§</sup>Three in the DS and 21 in the NDS group were excluded because they did not respond.

Table 4 shows the values of INQ for each group. In parameter of nutritional quality, the INQ values of protein, niacin, calcium, and phosphorus in the subjects with DS were lower than in the subjects with NDS. But with the exception of riboflavin, niacin and calcium, the values were higher than 1.0.

Calorie-corrected INQ scores were below the recommended intake of nutrients in riboflavin, niacin, and calcium in both groups. Especially in the DS group, the levels of these nutrients were low, and niacin showed a significant p-trend. Niacin, a water-soluble vitamin, is a nutrient involved in the body's energy metabolism, and most protein foods, such as meat and meat products, are good sources of niacin. It is necessary to recommend a dietary protein source, which is likely to be lacking in subjects with stress and depression. Among eight nutrients (protein, thiamine, riboflavin, niacin, vitamin C, calcium, phosphorus, and iron),

the least-consumed nutrient was calcium in all groups. The lack of calcium can cause problems such as fracture and osteoporosis, so it is necessary to encourage the elderly to consume calcium steadily.

Lee et al. investigated food intake and dietary habits as related to the depression in Korean adults aged 50 or older. They found that subjects with depressive symptoms tended to have no appetite, consume less fruits and vegetables, and make unhealthy food choices, such as higher intake of fatty meat (Lee S *et al.*, 2014), than did the non-depression group. Fruits and vegetables are rich in minerals, which are involved in the action of neurotransmitters (Młyniec K *et al.*, 2014). In a recent study of Japanese, low intakes of zinc, copper, and magnesium have been reported to increase depression and anxiety (Nakamura M *et al.*, 2019).

**Table 4: Comparison of Nutrient an INQ according to Stress and Depression**

	Total (n=1,920)		p-value
	DS(n=188)	NDS (n=1,732)	
<b>INQ</b>			
Protein (g)	1.03±0.02	1.16±0.01	<0.001
Thiamin (mg/day)	1.45±0.04	1.42±0.01	0.375
Riboflavin (mg/day)	0.79±0.05	0.79±0.01	0.973
Niacin (mg)	0.81±0.03	0.90±0.01	0.003
Vitamin C (mg)	1.04±0.09	0.98±0.03	0.482
Calcium (mg)	0.52±0.03	0.59±0.01	0.015
Phosphorus (mg)	1.19±0.03	1.35±0.01	<0.001
Iron (mg)	1.84±0.09	2.04±0.05	0.061

Data represents Mean±S.E(Standard Error). INQ: Index of nutritional quality.

Tested by a survey GLM for continuous variables.

In our study, we could not compare the nutrients from previous studies, because of the limitations of the KNHANES database. However, the proportion of subjects in the DS group that consumed enough food and a variety foods was low. Although the overall quality of dietary intake was low in the DS group, the intake of minerals such as magnesium and zinc could not be compared, so further studies based on the Korean database will be needed. Several studies of relatively young subjects have reported that mental problems such as stress cause obesity (Chamik T *et al.*, 2018), perhaps because of the choice of sweet or fatty

foods under stress or depression (Dallman M F *et al.*, 2006).

The limitations of this study are as follows. First, the questionnaires were all self-reports, and it had no objective measures of food intake or health related survey. Second, our study only carried out comparisons between groups and did not correct for confounding variables. In spite of its limitations, we used a database that could represent the Korea elderly, and investigated the management of dietary habits in the elderly as related to depression and stress status.

### **Conclusion**

This study investigated comparison of dietary habits according to stress and depression status in the elderly. In relation to eating habits, the proportion of subjects in the DS group that they consumed enough and varied foods was low. In summary, DS groups showed poorer dietary habits than the NDS groups. Future studies will need how the symptoms of depression and mental stress in the elderly correlates with the prevalence of depression and confirmed the effect of nutrient intake on this association in large-scale cohort or cross-section studies.

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