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A Study on the Nutrient Intakes of Hospitalized Elderly Dementia Patients Receiving a Regular Diet

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ABSTRACT The purpose of the present study was to examine the nutrient intake status of elderly dementia patients. We surveyed the dietary intake of 50 demented elderly patients receiving a regular diet, who were hospitalized in a geriatric hospital in Yongin, Gyeonggi-do. The average age of the subjects was 79.6 ± 6.5 for the males and 80.5 ± 6.3 for the females. The average heights were 169.5 ± 6.0 cm (males) and 154.6 ± 5.2 cm (females), and the average weights were 58.5 ± 7.4 (males) and 51.7 ± 8.9 kg (females). Depending on the type of dementia, the male patients showed significant differences in their intakes of vegetable protein, fiber, total iron, and non-heme iron between the Alzheimer's disease (AD) and the vascular dementia (VD) groups, and the female patients showed significant differences in their intakes of total protein, phosphorus, zinc, and vitamin B_6 between the two groups. The male patients showed significant differences in their intakes of animal-source calcium and carotene according to ability to self-feed. According to physical activity, the male patients showed significant differences in vegetable fat and vitamin A intake, and the females showed significant differences in their intakes of total protein, animal protein, fiber, ash, total calcium, vegetable-source calcium, animal-source calcium, phosphorous, total iron, non-heme iron, heme iron, sodium, vitamins B_1, B_2, B_6, niacin, vitamin C, folate, and potassium. We found that the patients consumed excessive protein, but low amounts of calcium, vitamin B_2, and folate. Also, the patients' physical activity abilities appeared to affect their nutrient intakes.

KEYWORDS: *dementia, elderly, nutrition intakes*

INTRODUCTION

Continuous improvement in living standards and the development of health and medical technologies have lead to a continuous increase in the elderly population. The number of people over 65 years of age has increased rapidly since 1995, reaching 4 million in 2005, within 5 years after reaching 3 million in 2000. Compared to the proportion of 7.3% in 2000, the proportion of elderly increased to 9.3% in the year 2005, showing a 2.0% increase (1). Due to this increase, social welfare, health, and medical attention has focused on the older population, and the nutritional problems of the elderly have become a serious issue. In our country, nutritional studies of the elderly were initiated in the later 1980s, and studies focusing on the general elderly populations of regional communities have been performed (2,3,4,5,6,7). The prevalence rates of chronic diseases caused by aging have increased with the increasing dementia prevalence rate during old age. Although a large-scale nationwide epidemiologic investigation has not been conducted to reveal the dementia prevalence rate, the results from investigation on dementia prevalence in some regional communities since 1990 suggest that approximately 3.4% of those over 60 years of age, and 5.0% of those over 65 years of age, are estimated to be dementia patients (8). Because of the significant increase in the dementia prevalence rate with increasing age, the average increase in lifespan has caused the rapid increase of dementia patients within the elderly population (9). With the increasing social demand for specialized treatment facilities that can provide appropriate treatment and protective environments for those with dementia, specialized hospital providing medical services for the elderly and for elderly dementia patients have recently emerged, and the hospitalization rate of elderly dementia patients has increased. Due to cognitive injury, specific dietary intake patterns can be expected. However, no study has been conducted on the nutrient intake status of elderly dementia patients. Therefore, the present article attempts to assess the nutrient intake status of elderly dementia patients hospitalized in a specialized hospital for the elderly, to

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provide basic data that could be utilized for the nutrition management of this population.

SUBJECTS AND METHODS

Subjects

The subjects were 50 elderly patients who were hospitalized in a geriatric hospital in Yongin, Gyeoggi-do. The subjects had an alzheimer disease or vascular dementia and took a regular diet. This study was done from March, 2006 to May, 2006.

Medical records

Age, sex, weights, heights, and BMI (body mass index), type of dementia, period of hospitalization, and score of Korean-Mini Mental State Examination (K-MMSE) of subjects were obtained from medical records.

Questionnaire

A questionnaire included the questions about general characteristics and ability of physical activity administered to subjects under the direction of trained investigator.

Nutrients intake assessment

Three-days record was used for dietary assessments. And every dishes food were measured the weights before and after meal time. Nutrients intakes were analyzed by the Computer-Aided Nutrition Analysis Program for Professionals 2.0 (Can-Pro 2.0, Korea Nutrition Society, 2002).

Statistical analysis

The statistical analysis was conducted using SPSS (ver. 12.0) statistical software. Frequency counts (%), mean and standard deviation was calculated. Student t-test and ANOVA were employed to detect significant differences.

RESULTS AND DISCUSSION

General profile of the subjects

The general profile of the subject population is summarized in Table 1. Fourteen male (28.0%) and 36 female (72.0%) elderly dementia patients were included in the study. The mean age of the males was 79.9 ± 6.5, and it was 80.5 ± 6.3 for the females. The mean heights were 169.5 ± 6.0 cm (males) and 154.6 ± 5.2 cm (females), and the mean weights were 58.5 ± 7.4 kg (males) and 51.7 ± 8.9 kg (females). The mean BMI of the male patients was 20.6 ± 3.9 and that of the females was 21.7 ± 3.6, and the mean hospitalization period for the male patients was 22.1 ± 20.7 months and that of the female patients was 21.4 ± 15.5 months. Based on the Dietary Reference Intakes (DRI) suggested by the Korea Nutrition Society Office (10), the standards of physical status for males older than 75 years are 164 cm for height and 59.2 kg for weight, and the guidelines suggest 151 cm of height and 50.2 kg of weight for females older than 75 years of age. Thus, the patients' heights were taller than the suggested physical standard and the weights of the male patients tended to be lower than the suggested standard.

Nutrient consumption status of patients

The dietary intakes of the patients by sex are summarized in Table 2. And the dietary intake ratios to the Recommended Intake (RI) values are summarized in Table 3. The mean energy intakes of the male and female patients were 1812.1 ± 376.6 kcal and 1523.8 ± 302.9 kcal, respectively. These amounts corresponded to 90.6% and 95.2% of the estimated energy requirements of the Korean Dietary Reference Intakes. This result is similar to the energy intake levels of male and female patients at facilities in urban areas, which were 98.9% and 82.0%, respectively, in a study by Song *et al.* (11). The protein intake of the patients was more than that of the general elderly population over 65 years of age that was reported by a National Nutrition Survey (12). In the case of healthy older people, the protein requirement level is equivalent to the level of normal adults (0.8 g/kg/day). However, recent studies have proposed a higher requirement level of 1.0 g/kg/day since protein turnover occurs more rapidly in elderly patients than in healthy older people, and negative nitrogen balance can occur from the stress of infections. In particular, acute and chronic diseases in many elderly people necessitate additional protein for the body as well as to replenish tissue damage. In addition, a

Table 1. General characteristics of the subjects

	Male (N = 14)			Female (N = 16)		
	AD[1] (N = 10)	VD[2] (N = 4)	Total (N = 14)	AD (N = 18)	VD (N = 18)	Total (N = 36)
Age (year)	79.1±7.2[3]	81.8±4.3	79.9±6.5	82.0±5.0	78.9±7.2	80.5±6.3
Height (cm)	170.4±5.7	167.3±7.3	169.5±6.0	153.7±4.1	155.6±6.1	154.6±5.2
Weight (kg)	57.5±6.2	61.1±10.4	58.5±7.4	52.3±9.1	51.1±9.0	51.7±8.9
BMI (kg/m^2)	19.9±3.2	22.2±5.6	20.6±3.9	22.1±3.2	21.2±4.0	21.7±3.6
Months of hospital treatment	26.5±22.7	11.3±9.2	22.1±20.7	22.4±17.9	20.4±3.1	21.4±15.5

[1]AD: alzheimer disease.
[2]VD: vascular dementia.
[3]Mean ± SD.

Table 2. Nutrients intakes of the subjects

Nutrients	Male (N = 14)	Female (N = 36)	Male 65≤[1)]	Female 65≤
Energy (kcal)	1812.1±376.6[2)]	1523.8±302.9	1882.7±42.1[4)]	1482.4±20.0
Total-Protein (g)	83.1±16.9	69.6±15.3	69.1±2.1	51.8±1.1
plant-Protein	43.9±10.4	36.7±7.7	-	-
animal-Protein	39.2±8.3	33.0±10.2	25.8±1.6	16.7±0.8
Total-Lipid (g)	40.5±12.0	35.0±10.9	29.6±1.3	20.3±0.7
plant-Lipid	24.7±10.4	21.4±8.7	-	-
animal-Lipid	15.8±3.7	13.6±5.9	11.2±0.8	6.8±0.5
Carbohydrate (g)	277.1±55.0	234.0±46.5	312.9±6.6	267.9±3.6
Fiber (g)	7.1±1.3	6.6±1.9	7.7±0.3	6.3±0.2
Ash (g)	22.4±4.5	19.5±4.9	20.8±0.7	16.4±0.4
Total-Calcium (mg)	568.7±149.0	501.7±138.5	545.8±27.3	456.5±18.7
plant-Calcium	342.2±88.9	306.1±69.1	-	-
animal-Calcium	226.5±77.6	195.6±92.1	-	-
Phosphorus (mg)	1091.0±215.9	927.5±200.3	1201.9±31.8	948.0±18.7
Total-Iron (mg)	15.1±3.6	12.8±2.6	14.1±0.7	11.6±0.6
plant-Iron	12.3±3.1	10.4±2.1*[3)]	-	-
animal-Iron	2.8±0.7	2.4±0.8	-	-
Natrium (mg)	6627.0±1511.1	5809.0±1687.3	5400.4±171.2	4224.2±119.2
Potassium (mg)	2894.3±523.4	2580.0±615.9	2672.3±83.1	2145.9±51.1
Zinc (mg)	9.8±1.7	8.4±1.7	-	-
Vitamin A (RE)	727.7±191.7	706.5±273.8	660.1±35.8	591.8±31.1
retinol	76.7±26.1	67.3±37.1	-	-
carotene	3809.0±1061.5	3634.6±1475.6	-	-
Vitamin B_1 (mg)	1.1±0.2	1.0±0.2	1.06±0.04	0.81±0.02
Vitamin B_2 (mg)	1.2±0.2	1.0±0.3	0.95±0.04	0.73±0.02
Vitamin B_6 (mg)	2.0±0.4	1.7±0.5	-	-
Niacin (mg)	17.1±3.0	14.3±3.5	15.3±0.4	11.6±0.2
Vitamin C (mg)	117.4±31.8	116.8±43.6	83.8±4.3	70.3±3.0
Folate (mg)	252.6±56.0	243.0±61.9	-	-
Vitamin E (mg)	10.5±4.0	9.3±2.9	-	-
Cholesterol (mg)	266.7±99.2	215.2±79.7	-	-

[1)]Ministry of Health and Welfare. 2005. National Health and Nutrition Examination Survey 2005
[2)]Mean ± SD
[3)]Significantly different between male and female by *t*-test ($p < 0.05$)
[4)]Mean ± SE

study conducted by Park *et al.* (13), which was directed at finding the relationship between cognition and the dietary intake patterns of 332 elderly people, revealed higher cognition scores when protein intake was higher. However, there are no reports on whether high protein intake affects the cognitive function of dementia patients, and excessive protein intake is suggested as being related to the development of chronic degenerative diseases (14). Thus, an appropriate consumption of high quality protein with a high protein efficiency must occur by dividing protein intake over several times in a day.

The mean iron intake was 15.1 ± 3.6 mg for the males and 12.8 ± 2.6 mg for the females. There was a significant difference in the intake of non-heme iron ($p < 0.05$). Although the iron intake was found to be higher than the recommended dietary intake, it was mainly supplemented by vegetable sources. Thus, a continuous iron intake is required when considering the actual utilization rate (15). The consumption of sodium was found to be high and thought to be contributed by the fact that most of the patients continuously consumed their favorite foods such as sauces, salted fish, and salted pickles rather than the provided meals. The intake of calcium was lower than the RI in both the male and female patients. Since an appropriate level of serum calcium should be maintained for normal heart and neuronal system function (16), and since calcium metabolism is very important for the nutritional status and physical health of elderly people, sufficient calcium intake must

Table 3. Percentage for Recommended Intake of nutrients intakes

	Male (N = 14)	Female (N = 36)	Male 65≤[1)]	Female 65≤
Energy	90.6±18.8[2)]	95.2±18.9	94.1±2.1[3)]	92.7±1.2
Protein	166.3±33.9	154.8±34.0	138.2±4.1	115.2±2.4
Calcium	81.2±21.3	62.7±17.3	78.0±3.9	57.1±2.3
Phosphorus	155.9±30.9	132.5±28.6	171.7±4.5	135.4±2.7
Iron	150.8±36.2	142.0±28.4	140.6±6.9	129.2±6.1
Zinc	119.0±18.1	119.2±23.9	-	-
Vitamin A	104.0±27.4	117.7±45.6	94.3±5.1	98.6±5.2
Vitamin B_1	92.6±16.7	86.8±18.4	88.2±3.2	73.7±1.6
Vitamin B_2	77.2±16.0	86.1±20.8	63.4±2.4	60.8±1.7
Vitamin B_6	133.3±27.5	124.1±32.3	-	-
Niacin	106.8±18.9	102.1±24.8	95.9±2.8	83.0±1.7
Vitamin C	117.4±31.8	116.8±43.5	83.8±4.3	70.3±3.0
Folate	63.1±14.0	60.7±15.5	-	-

[1)]Ministry of Health and Welfare. 2005. National Health and Nutrition Examination Survey.
[2)]Mean ± SD
[3)]Mean ± SE

Table 4. Classification for Dietary Reference Intakes of nutrients intakes of the subjects

Nutrients	Sex	Nutrients intakes ≥ EAR	EAR < Nutrients intakes ≤ RI	RI < Nutrients intakes
Protein	Males	0(0.0)	0(0.0)	14(100.0)
	Females	0(0.0)	3(8.3)	33(91.7)
Calcium	Males	8(57.1)	3(21.4)	3(21.4)
	Females	25(69.4)	8(22.2)	3(8.3)
Phosphorus	Males	0(0.0)	0(0.0)	14(100.0)
	Females	2(5.6)	3(8.3)	31(86.1)
Iron	Males	0(0.0)	0(0.0)	14(100.0)
	Females	1(2.8)	1(2.8)	34(94.4)
Zinc	Males	0(0.0)	2(14.3)	12(85.7)
	Females	3(8.3)	6(16.7)	28(77.8)
Vitamin A	Males	1(7.1)	7(50.0)	6(42.9)
	Females	3(8.3)	13(36.1)	20(55.6)
Vitamin B_1	Males	6(42.9)	4(28.6)	4(28.6)
	Females	17(47.2)	14(38.9)	5(13.9)
Vitamin B_2	Males	12(85.7)	1(7.1)	1(7.1)
	Females	21(58.3)	9(25.1)	6(16.7)
Vitamin B_6	Males	1(7.1)	1(7.1)	12(85.7)
	Females	6(16.7)	2(5.6)	28(77.8)
Niacin	Males	0(0.0)	5(35.7)	9(64.3)
	Females	4(11.1)	15(41.7)	17(47.2)
Vitamin C	Males	1(7.1)	4(28.6)	9(64.3)
	Females	6(6.7)	8(22.2)	22(61.1)
Folate	Males	11(78.6)	3(21.4)	0(0.0)
	Females	32(88.9)	3(8.3)	1(2.8)

occur. In addition, there are greater risk factors of bone density reduction and osteoporosis in the elderly than in other age groups (17). Therefore, the provision of calcium in the form of easily digestible and absorbable meals seems necessary, along with sufficient calcium supplementation.

For the intake of folate, the intakes of both the male and female patients were lower than the level suggested by the RI. Folate deficiency in the elderly is largely related to insufficient folate intake at meals, gastrointestinal atrophy, and the use of drugs or antacids that prevent the absorption

Table 5. Nutrients intakes of the subjects according to the type of dementia

	Male (N = 14)			Female (N = 36)		
	AD[1] (N = 10)	VD[2] (n = 4)	Total (n = 14)	AD (N = 18)	VD (n = 18)	Total (n = 36)
Energy (kcal)	1840.9±444.2[3]	1740.0±113.6	1812.1±376.6	1518.8±334.9	1529.7±276.8	1523.8±302.9
Total-Protein (g)	84.0±20.0	81.1±5.7	83.1±16.9	70.9±18.2	68.4±12.1*	69.6±15.3
plant-Protein	45.6±11.8	39.7±3.5*[4]	43.9±10.4	36.7±8.5	36.6±7.0	36.7±7.7
animal-Protein	38.4±9.6	41.4±4.0	39.2±8.3	34.2±11.1	31.8±9.4	33.0±10.2
Total-Lipid (g)	42.4±13.7	35.9±4.2	40.5±12.0	36.4±9.4	33.6±12.3	35.0±10.9
plant-Lipid	27.1±11.4	18.9±4.7	24.7±10.4	21.7±6.2	21.1±10.8	21.4±8.7
animal-Lipid	15.4±4.2	17.0±1.7	15.8±3.7	14.7±6.8	12.5±4.8	13.6±5.9
Carbohydrate (g)	279.7±65.0	270.4±19.6	277.1±55.0	229.8±51.4	238.1±42.2	234.0±46.5
Fiber (g)	7.1±1.5	7.1±0.9*	7.1±1.3	6.5±2.9	6.8±1.9	6.6±1.9
Ash (g)	22.7±4.9	21.8±3.6	22.4±4.5	19.9±5.6	19.2±4.1	19.5±4.9
Total-Calcium (mg)	527.7±165.1	558.6±119.4	568.7±149.0	501.6±162.8	501.7±113.9	501.7±138.5
plant-Calcium	342.8±93.9	340.7±88.3	342.2±88.9	299.4±79.0	312.7±59.1	306.1±69.1
animal-Calcium	229.9±90.6	218.0±36.4	226.5±77.6	202.2±93.1	189.0±93.2	195.6±92.1
Phosphorus (mg)	1110.5±249.2	1042.2±106.6	1091.0±215.9	942.4±240.5	912.7±155.8*	927.5±200.3
Total-Iron (mg)	15.5±4.2	14.1±1.8*	15.1±3.6	12.7±3.0	12.9±2.1	12.8±2.6
plant-Iron	12.7±3.5	11.1±1.7*	12.3±3.1	10.3±2.4	10.6±1.8	10.4±2.1
animal-Iron	2.8±0.8	3.0±0.4	2.8±0.7	2.5±0.8	2.3±0.8	2.4±0.8
Natrium (mg)	655.1±1696.9	6819.3±1089.9	6627.0±1511.1	5928.0±1815.3	5690.2±1592.4	5809.0±1687.3
Potassium (mg)	2932.8±580.6	2798.0±398.4	2894.3±523.4	2595.8±736.5	2564.1±487.8	2580.0±615.9
Zinc (mg)	9.8±2.0	9.7±0.8	9.8±1.7	8.6±2.0	8.1±1.3*	8.4±1.7
Vitamin A (RE)	710.0±202.5	772.2±180.2	727.7±191.7	711.9±291.7	701.1±263.0	706.5±273.8
retinol	78.3±30.6	72.6±10.8	76.7±26.1	66.6±26.8	68.0±46.0	67.3±37.1
carotene	3697.6±1103.5	4087.7±1041.	3809.0±1061.5	3696.9±1614.2	3572.3±1367.1	3634.6±1475.6
Vitamin B_1 (mg)	1.1±0.2	1.1±0.2	1.1±0.2	1.0±0.3	1.0±0.2	1.0±0.2
Vitamin B_2 (mg)	1.2±0.3	1.2±0.1	1.2±0.2	1.1±0.3	1.0±0.2	1.0±0.3
Vitamin B_6 (mg)	2.0±0.5	2.0±0.3	2.0±0.4	1.8±0.6	1.7±0.3*	1.7±0.5
Niacin (mg)	17.1±3.5	17.0±1.6	17.1±3.0	14.7±4.1	13.9±2.8	14.3±3.5
Vitamin C (mg)	112.7±34.0	129.0±25.8	117.4±31.8	114.8±45.5	118.8±42.7	116.8±43.6
Folate (mg)	252.5±61.0	252.7±49.1	252.6±56.0	236.8±61.7	249.2±63.2	243.0±61.9
Vitamin E (mg)	10.4±4.6	10.6±2.4	10.5±4.0	9.1±2.9	9.5±3.0	9.3±2.9
Cholesterol (mg)	268.3±118.5	262.9±22.0	266.7±99.2	215.4±69.0	251.1±91.2	215.2±79.7

[1]AD: alzheimer disease
[2]VD: vascular dementia
[3]Mean ± SD
[4]Significantly different between AD and VD within sex by *t*-test ($p < 0.05$)

and utilization of folate. For elderly patients requiring long term medical treatment, there are many risk factors that can cause folate deficiency (16). In addition, folate deficiency causes vitamin B_{12} deficiency that can damage the neuronal system (18).

According to the nutrient intakes of the patients, we categorized them into a group taking lower than the estimated average requirement (EAR), a group taking more than the EAR and lower than the RI, and a group taking more than the RI, as summarized in Table 4. The vitamin B_2, folate, and calcium intakes of the patients were lower than the EAR. The vitamin B_2 intake of the males was 85.7%, and it was 58.3% for the females, which were lower than the EAR. The folate intake of the male patients was 78.6%, and it was 88.9% for the female patients, which was lower than the EAR. The calcium intake of the male patients was 57.1%, and it was 69.4% for the female patients, which was again lower than the EAR.

Nutrient intake status according to the type dementia

We also investigated the significant effects of dietary intake according to the type of dementia the patients had. The energy intake of the males with Alzheimer's dementia (AD) was 1840.9 ± 444.2 kcal, and the energy intake was 1740.0

Table 6. Percentage for Recommended Intake of nutrients intakes according to the type of dementia

	Male (N = 14)			Females (N = 36)		
	AD[1] (N = 10)	VD[2] (N = 4)	Total (N = 14)	AD (N = 18)	VD (N = 18)	Total (N = 36)
Energy	92.0±22.2[3]	87.0±5.7	90.6±18.8	94.9±20.9	95.6±17.3	95.2±18.9
Protein	167.9±40.1	162.3±11.5	166.3±33.9	157.6±40.5	151.9±27.0*	154.8±34.0
Vitamin A	101.4±28.9	110.3±25.7	104.0±27.4	118.7±48.6	116.8±43.8	117.7±45.6
Vitamin E	104.4±45.8	106.0±24.4	104.8±39.9	91.3±28.9	95.0±30.1	93.2±29.1
Vitamin C	112.7±34.0	129.0±25.8	117.4±31.8	114.8±45.5	118.8±42.7	116.8±43.5
Vitamin B_1	93.1±18.1	91.3±15.1	92.6±16.7	87.3±22.4	86.3±14.1	86.8±18.4
Vitamin B_2	77.1±18.8	77.4±7.5	77.2±16.0	88.5±23.9	83.8±17.5	86.1±20.8
Niacin	107.1±21.9	106.3±10.2	106.8±18.9	104.7±29.2	99.5±20.0	102.1±24.8
Vitamin B_6	132.5±30.6	135.4±21.4	133.3±27.5	125.6±39.8	122.6±23.5*	124.1±32.3
Folate	63.1±15.3	63.2±12.3	63.1±14.0	59.2±15.4	62.3±15.8	60.7±15.5
Calcium	81.8±23.6	79.8±17.0	81.2±21.3	62.7±20.3	62.7±14.2	62.7±17.3
Phosphorus	158.6±35.6	148.9±15.1	155.9±30.9	134.6±34.4	130.4±22.3*	132.5±28.6
Iron	154.7±41.6	141.0±18.3*[4]	150.8±36.2	141.3±33.3	142.8±23.5	142.0±28.4
Zinc	118.0±20.9	121.5±10.4	119.0±18.1	123.0±28.6	115.5±18.3*	119.2±23.9

[1]AD: alzheimer disease
[2]VD: vascular dementia
[3]Mean ± SD
[4]Significantly different between AD and VD within sex by *t*-test ($p < 0.05$)

Table 7. Classification for Dietary Reference Intakes of nutrients intakes of the subjects according to the type of dementia

Nutrients	Type of dementia	Male (N = 14)			Female (N=36)		
		Nutrients intakes ≥EAR	EAR<Nutrients intakes≤RI	RI<Nutrients intakes	Nutrients intakes ≥EAR	EAR<Nutrients intakes≤RI	RI<Nutrients intakes
Protein	AD	0(0.0)	0(0.0)	10(100.0)	0(0.0)	2(11.1)	16(88.9)
	VD	0(0.0)	0(0.0)	4(100.0)	0(0.0)	1(5.6)	17(94.4)
Calcium	AD	5(50.0)	3(30.0)	2(20.0)	11(61.1)	5(27.8)	2(11.1)
	VD	3(75.0)	0(0.0)	1(25.0)	14(77.8)	3(16.9)	1(5.6)
Phosphorus	AD	0(0.0)	0(0.0)	10(100.0)	2(11.1)	1(5.6)	15(83.3)
	VD	0(0.0)	0(0.0)	4(100.0)	0(0.0)	2(11.1)	16(88.9)
Iron	AD	0(0.0)	0(0.0)	10(100.0)	1(5.6)	1(5.6)	16(88.9)
	VD	0(0.0)	0(0.0)	4(100.0)	0(0.0)	0(0.0)	18(100)
Zinc	AD	0(0.0)	2(20.0)	8(80.0)	2(11.1)	3(16.7)	13(72.2)
	VD	0(0.0)	0(0.0)	4(100.0)	1(5.6)	3(16.7)	14(77.8)
Vitamin A	AD	1(10.0)	5(50.0)	4(40.0)	2(11.1)	6(33.3)	10(55.6)
	VD	0(0.0)	2(50.0)	2(50.0)	1(5.6)	7(38.9)	10(55.6)
Vitamin B_1	AD	4(40.0)	3(30.0)	3(30.0)	7(38.9)	8(44.4)	3(16.7)
	VD	2(50.0)	1(25.0)	1(25.0)	10(55.6)	6(33.3)	2(11.1)
Vitamin B_2	AD	8(80.0)	1(10.0)	1(10.0)	8(44.4)	6(33.3)	4(22.2)
	VD	4(100.0)	0(0.0)	0(0.0)	13(72.2)	3(16.7)	2(11.1)
Vitamin B_6	AD	1(10.0)	1(10.0)	8(80.0)	5(27.8)	1(5.6)	12(66.7)
	VD	0(0.0)	0(0.0)	4(100.0)	1(5.6)	1(5.6)	16(88.9)
Niacin	AD	0(0.0)	4(40.0)	6(60.0)	3(16.7)	6(33.3)	9(50.0)
	VD	0(0.0)	1(25.0)	3(75.0)	1(5.6)	9(50.0)	8(44.4)
Vitamin C	AD	1(10.0)	4(40.0)	5(50.0)	4(22.2)	3(16.7)	11(61.1)
	VD	0(0.0)	0(0.0)	4(100.0)	2(11.1)	5(27.8)	11(61.1)
Folate	AD	8(80.0)	2(20.0)	0(0.0)	16(88.9)	2(11.1)	0(0.0)
	VD	3(75.0)	1(25.5)	0(0.0)	16(88.9)	1(5.6)	1(5.6)

[1]AD: alzheimer disease
[2]VD: vascular dementia

Table 8. Nutrients intakes of the subjects according to the self-feeding

	Male (N = 14)			Female (N = 36)		
	Self feeding (N = 9)	Nursing assistants (N = 5)	Total	Self feeding (N = 27)	Nursing assistants (N = 9)	Total (N = 36)
Energy(kcal)	1790.6±423.6[1)]	1850.8±314.8	1812.1±376.6	1526.2±302.4	1516.4±322.8	1523.8±302.9
Total-Protein(g)	81.4±17.3	86.4±17.6	83.1±16.9	70.1±15.5	68.4±15.6	69.6±15.3
plant-Protein	43.2±11.8	45.3±8.1	43.9±10.4	36.9±7.3	35.9±9.2	36.7±7.7
animal-Protein	38.2±8.0	41.1±9.6	39.2±8.3	33.2±10.5	32.5±9.8	33.0±10.2
Total-Lipid(g)	40.4±14.2	40.8±8.1	40.5±12.0	34.5±10.8	36.5±11.5	35.0±10.9
plant-Lipid	25.5±12.5	25.5±12.5	24.7±10.4	20.8±7.8	23.3±11.2	21.4±8.7
animal-Lipid	15.0±4.0	15.0±3.9	15.8±3.7	13.8±6.5	13.1±3.7	13.6±5.9
Carbohydrate(g)	274.4±61.0	281.7±48.6	277.1±55.0	235.6±47.6	229.1±45.3	234.0±46.5
Fiber(g)	7.3±1.5	7.1±0.9	7.1±1.3	6.9±2.0	5.9±1.4	6.6±1.9
Ash(g)	22.0±4.5	21.8±3.6	22.4±4.5	20.0±7.8	18.2±4.0	19.5±4.9
Total-Calcium(mg)	549.9±128.7	602.5±191.9	568.7±149.0	505.2±150.1	491.0±102.6	501.7±138.5
plant-Calcium	340.7±100.8	345.0±73.0	342.2±88.9	310.5±74.1	292.6±52.6	306.1±69.1
animal-Calcium	209.2±33.9	257.6±124.1*[2)]	226.5±77.6	194.7±101.9	198.4±57.7	195.6±92.1
Phosphorus(mg)	1069.0±220.8	1130.5±225.7	1091.0±215.9	932.0±207.4	914.1±188.2	927.5±200.3
Total-Iron(mg)	14.5±3.4	16.1±4.3	15.1±3.6	12.9±2.6	12.5±2.6	12.8±2.6
plant-Iron	11.8±3.0	13.1±3.7	12.3±3.1	10.5±2.0	10.2±2.4	10.4±2.1
animal-Iron	2.8±0.7	2.9±0.7	2.8±0.7	2.4±0.8	2.3±0.7	2.4±0.8
Natrium(mg)	6574.6±1714.8	6721.3±1234.2	6627.0±1511.1	5988.8±1811.8	5270.0±1162.2	5809.0±1687.3
Potassium(mg)	2816.2±482.5	3034.7±621.6	2894.3±523.4	2610.7±635.3	2487.6±578.8	2580.0±615.9
Zinc(mg)	9.6±1.7	10.2±2.0	9.8±1.7	8.4±1.7	8.3±1.6	8.4±1.7
Vitamin A(RE)	703.4±150.4	771.5±265.3	727.7±191.7	722.1±288.6	659.8±232.4	706.5±273.8
retinol	74.8±30.3	80.0±19.0	76.7±26.1	69.1±42.0	61.8±15.0	67.3±37.1
carotene	3681.0±813.9	4039.4±1494.6*	3809.0±1061.5	3705.9±1576.4	3420.7±1175.1	3634.6±1475.6
Vitamin B_1(mg)	1.1±0.2	1.1±0.2	1.1±0.2	1.0±0.2	0.9±0.2	1.0±0.2
Vitamin B_2(mg)	1.1±0.2	1.2±0.3	1.2±0.2	1.0±0.3	1.0±0.2	1.0±0.3
Vitamin B_6(mg)	1.9±0.4	2.2±0.4	2.0±0.4	1.8±0.5	1.7±0.5	1.7±0.5
Niacin(mg)	16.6±3.0	18.1±3.2	17.1±3.0	14.3±3.5	14.2±3.5	14.3±3.5
Vitamin C(mg)	110.5±29.6	130.6±34.6	117.4±31.8	124.0±44.8	95.2±33.0	116.8±43.6
Folate(mg)	250.5±51.5	256.3±69.7	252.6±56.0	248.4±65.5	226.7±49.1	243.0±61.9
Vitamin E(mg)	10.7±4.9	10.0±2.1	10.5±4.0	9.3±3.1	9.4±2.6	9.3±2.9
Cholesterol(mg)	269.5±120.4	261.7±54.2	266.7±99.2	216.5±85.6	211.6±63.1	215.2±79.7

[1)]Mean ± SD
[2)]Significantly different between groups within sex by *t*-test ($p < 0.05$)

± 113.6 kcal for the vascular dementia (VD) patients. The energy intakes of the female patients with AD and VD were 1517.8 ± 334.9 kcal and 1529.7 ± 276.8 kcal, respectively. Compared to the estimated energy intake of the Korean DRIs, the mean estimated energy intakes of the AD and VD males were 92.0 ± 22.2% and 87.0 ± 5.7%, and 84.9 ± 20.9% and 95.6 ± 17.3% for the female AD and VD patients, respectively. The mean protein intake for the male AD patients was 84.0 ± 20.0 g and that of the male VD patients was 81.1 ± 5.7 g, and there was a significant difference in the intake of vegetable protein. In the case of the female patients, total protein intake was significantly different between the two groups. Compared to the protein DRI, the mean protein intakes of the male AD and VD patients were 167.9 ± 40.1% and 162.3 ± 11.5%, and those of the female AD and VD patients were 157.6 ± 40.5% and 151.9 ± 27.0%, respectively. The mean dietary fiber intake of the male AD patients was 7.1 ± 1.5 g and that of the male VD patients was 7.1 ± 0.9 g, and a significant difference was found between the two groups. For the mean phosphorus intake, a significant difference was found for both the male and female patients in the two groups. Compared to the phosphorus DRI, the mean phosphorus intakes of the male AD and VD patients were 158.6 ± 35.6% and 148.9 ±

Table 9. Classification for Dietary Reference Intakes of nutrients intakes of the subjects according to the self-feeding

Nutrients	Feeding ability	Male (N = 14)			Female (N = 36)		
		Nutrients intakes ≥ EAR	EAR< Nutrients intakes ≤ RI	RI < Nutrients intakes	Nutrients intakes ≥ EAR	EAR< Nutrients intakes ≤ RI	RI < Nutrients intakes
Protein	self feeding	0(0.0)	0(0.0)	9(100.0)	0(0.0)	2(7.4)	25(92.6)
	nursing assistants	0(0.0)	0(0.0)	5(100.0)	0(0.0)	1(11.1)	8(88.9)
Calcium	self feeding	5(55.6)	2(22.2)	2(22.2)	18(66.7)	7(25.9)	2(7.4)
	nursing assistants	3(60.0)	1(20.0)	1(20.0)	7(77.8)	1(11.1)	1(11.1)
Phosphorus	self feeding	0(0.0)	0(0.0)	9(100.0)	2(7.4)	1(3.7)	24(88.9)
	nursing assistants	0(0.0)	0(0.0)	5(100.0)	0(0.0)	2(22.2)	7(77.8)
Iron	self feeding	0(0.0)	0(0.0)	9(100.0)	1(3.7)	0(0.0)	26(96.3)
	nursing assistants	0(0.0)	2(22.2)	4(100.0)	0(0.0)	1(11.1)	8(88.9)
Zinc	self feeding	0(0.0)	2(20.0)	5(80.0)	2(7.4)	5(18.5)	20(74.1)
	nursing assistants	0(0.0)	0(0.0)	7(77.8)	1(11.1)	1(11.1)	7(77.8)
Vitamin A	self feeding	0(0.0)	5(55.6)	5(100.0)	1(3.7)	10(37.0)	16(59.3)
	nursing assistants	1(20.0)	2(50.0)	4(44.4)	2(22.2)	3(33.3)	4(44.4)
Vitamin B_1	self feeding	4(44.4)	3(33.3)	2(22.2)	13(48.1)	10(37.0)	4(14.8)
	nursing assistants	2(40.0)	1(20.0)	2(40.0)	4(44.4)	4(44.4)	1(11.1)
Vitamin B_2	self feeding	8(88.9.0)	1(11.1)	0(0.0)	15(55.6)	8(29.6)	4(14.8)
	nursing assistants	4(80.0)	0(0.0)	1(20.0)	6(66.7)	1(11.1)	2(22.2)
Vitamin B_6	self feeding	1(10.0)	1(11.1)	7(77.8)	3(11.1)	2(7.4)	22(81.5)
	nursing assistants	0(0.0)	0(0.0)	5(100.0)	3(33.3)	0(0.0)	6(66.7)
Niacin	self feeding	0(0.0)	4(44.4)	5(55.6)	2(7.4)	13(48.1)	12(44.4)
	nursing assistants	0(0.0)	1(20.0)	4(80.0)	2(22.2)	2(22.2)	5(55.6)
Vitamin C	self feeding	1(10.0)	4(44.4)	5(55.6)	2(7.4)	7(25.9)	20(74.1)
	nursing assistants	0(0.0)	0(0.0)	4(80.0)	4(44.4)	1(11.1)	4(44.4)
Folate	self feeding	8(80.0)	2(22.2)	0(0.0)	23(85.2)	3(11.1)	1(3.7)
	nursing assistants	3(75.0)	1(20.0)	0(0.0)	9(100.0)	0(0.0)	0(0.0)

15.1%, and those of the female AD and VD patients were 134.6 ± 34.4% and 130.4 ± 22.3%, respectively. In the case of iron, the total iron intake and non-heme iron intake of the male patients showed no significant differences between the two groups. Compared to the DRI for iron, the mean iron intakes of the male AD and VD patients were 154.7 ± 41.6% and 141.0 ± 18.3%, and those of the female AD and VD patients were 141.3 ± 33.3% and 142.8 ± 23.5%, respectively. In the case of zinc, a significant difference was found between the AD and VD groups of female patients. Compared to the DRI for zinc, the mean zinc intakes of the male AD and VD patients were 118.0 ± 20.9% and 121.5 ± 10.4%, and those of the female AD and VD patients were 123.0 ± 28.6% and 115.5 ± 18.3%, respectively. For vitamin B_6, a significant difference was found between the AD and VD groups of female patients. Compared to the vitamin B_6 DRI, the mean vitamin B_6 intakes in the male AD and VD patients were 132.5 ± 30.6% and 135.4 ± 21.4%, and those in the female AD and VD patients were 125.6 ± 39.8% and 122.6 ± 23.5%, respectively.

According to the type of dementia the patients had, differences from the distribution of the DRIs were investigated (Table 7). For both the AD and VD groups of male and female patients, the intakes of protein, phosphorus, iron, zinc, vitamin B_6, and Vitamin C were more than the levels of the RI, but the intakes for calcium, vitamin B_2, and folate were lower than the levels of the EAR.

Nutrient intake status according to self-feeding

From the classification of self-feeding, the patients were analyzed to see whether or not they could eat by themselves, where 64.3% of the male dementia patients were able to eat on their own, and 35.7% required the aid of caregivers. In the case of the female dementia patients, 70.5% were able to eat on their own and 25.0% required the aid of caregivers.

Nutrient intake levels were compared based on the ability to self-feed. The two groups of male dementia patients revealed significant differences in their animal-source calcium as well as carotene intakes, and the female dementia patients did not show any differences between the two groups, as summarized in Table 8.

Based upon the patients' abilities to feed themselves, no significant distributional differences from the DRIs could be categorized for investigation, as summarized in Table 9.

Table 10-1. Nutrients intakes of the subjects according to movement status (male)

	Male (N = 14)		
	Walking able (N = 6)	Assisting devices (N = 8)	Total (N = 14)
Energy (kcal)	1863.5±497.4[1)]	1773.5±287.5	1812.1±376.6
Total-Protein (g)	84.2±20.1	82.3±15.6	83.1±16.9
plant-Protein	47.1±12.9	41.5±8.1	43.9±10.4
animal-Protein	37.1±8.8	40.8±8.2	39.2±8.3
Total-Lipid (g)	44.9±15.5	37.3±8.2	40.5±12.0
plant-Lipid	29.9±13.4	20.9±5.8*[2)]	24.7±10.4
animal-Lipid	15.0±4.4	16.4±3.2	15.8±3.7
Carbohydrate (g)	280.6±74.8	274.4±40.1	277.1±55.0
Fiber (g)	7.1±1.5	7.1±1.3	7.1±1.3
Ash (g)	22.4±4.5	22.4±4.7	22.4±4.5
Total-Calcium (mg)	552.8±123.3	580.6±173.3	568.7±149.0
plant-Calcium	347.2±103.5	338.5±83.5	342.2±88.9
animal-Calcium	205.7±24.7	242.1±100.5	226.5±77.6
Phosphorus (mg)	1106.9±243.1	1079.1±209.7	1091.0±215.9
Total-Iron (mg)	15.1±3.7	15.1±3.8	15.1±3.6
plant-Iron	12.4±3.2	12.1±3.3	12.3±3.1
animal-Iron	2.7±0.9	2.9±0.6	2.8±0.7
Natrium (mg)	6693.8±1917.1	6577.0±1268.4	6627.0±1511.1
Potassium (mg)	2881.6±443.0	2903.8±606.9	2894.3±523.4
Zinc(mg)	9.6±1.9	9.9±1.7	9.8±1.7
Vitamin A (RE)	656.1±118.1	781.5±224.9*	727.7±191.7
retinol	83.9±35.6	72.1±16.8	76.7±26.1
carotene	3349.7±580.3	4153.6±1239.1*	3809.0±1061.5
Vitamin B_1 (mg)	1.1±0.2	1.1±0.2	1.1±0.2
Vitamin B_2 (mg)	1.1±0.2	1.2±0.3	1.2±0.2
Vitamin B_6 (mg)	2.0±0.4	2.1±0.4	2.0±0.4
Niacin (mg)	17.0±3.0	17.2±3.3	17.1±3.0
Vitamin C (mg)	118.1±38.0	116.0±29.1	117.4±31.8
Folate (mg)	242.2±64.0	260.3±52.3	252.6±56.0
Vitamin E (mg)	10.8±5.5	10.2±2.8	10.5±4.0
Cholesterol (mg)	286.6±148.5	251.8±44.0	266.7±99.2

[1)]Mean ± SD
[2)]Significantly different between groups within male by *t*-test ($p < 0.05$)

Among the male and female dementia patients, intakes by the self-feeding patients and patient having support from caregivers exceeded the RIs for protein, phosphorus, iron, zinc, vitamin B_6, and vitamin C, but the intakes of calcium, vitamin B_2, and folate were lower than the EARs.

Nutrient intake status according to movement status

In observing the activity levels of the male dementia patients, 42.9% did not have problems moving, and 57.1% required aids such as a wheelchair. In the case of the female dementia patients, 11.5% did not have problems moving, and 75.0% required movement aids, and 13.9% of the patients were disabled and could not move at all.

In examining nutrient intake status based on activity levels, a significant difference was found between the male dementia patient group who did not have problems moving and the patient group requiring movement aids for the intake of vegetable oil, vitamin A, and carotene, as summarized in Table 10-1. In the case of the females, significant differences were found among the group of female dementia patients who did not have problems moving, the patient group requiring movement aids, and the disabled patient group, for intakes of total protein, animal protein, dietary fiber, ash, total calcium, vegetable-source calcium, animal-source calcium, phosphorus, total iron, non-heme iron, heme iron, sodium, vitamins B_1, B_2, B_6, niacin, vitamin C, folate, and calcium, as summarized in Table 10-2. The disabled patient group was significantly different from the patient group that

Table 10-2. Nutrients intakes of the subjects according to movement status (female)

	Female (N = 16)			
	Walking able (N = 4)	Assisting devices (N = 27)	Bed ridden (N = 5)	Total (N = 14)
Energy (kcal)	1646.4±365.0[1)]	1550.3±283.4	1282.6±297.2	1523.8±302.9
Total-Protein (g)	81.9±21.4	70.5±13.0	55.2±13.7*[2)]	69.6±15.3
plant-Protein	40.0±9.1	37.4±6.9	30.2±8.6	36.7±7.7
animal-Protein	41.9±12.5	33.2±9.0	25.0±10.7*	33.0±10.2
Total-Lipid (g)	40.8±11.3	34.3±10.7	34.2±12.6	35.0±10.9
plant-Lipid	22.3±6.0	21.8±9.2	18.4±8.0	21.4±8.7
animal-Lipid	18.5±6.4	16.4±3.2	15.7±10.8	13.6±5.9
Carbohydrate (g)	239.7±54.8	239.1±44.0	201.5±50.7	234.0±46.5
Fiber (g)	9.2±3.2	6.4±1.4	5.8±1.4*	6.6±1.9
Ash (g)	24.8±8.0	19.5±3.9	15.4±3.0*	19.5±4.9
Total-Calcium (mg)	652.1±192.3	505.8±107.4	358.8±129.4**[3)]	501.7±138.5
plant-Calcium	367.8±109.9	308.3±53.3	244.5±75.0*	306.1±69.1
animal-Calcium	284.3±88.4	197.5±84.4	114.3±76.6*	195.6±92.1
Phosphorus (mg)	1110.7±288.9	935.3±169.5	739.1±152.3*	927.5±200.3
Total-Iron (mg)	15.1±3.7	12.9±2.0	10.3±3.7*	12.8±2.6
plant-Iron	12.0±2.8	10.6±1.7	8.4±2.5*	10.4±2.1
animal-Iron	3.1±0.8	2.3±0.7	1.9±0.8*	2.4±0.8
Natrium (mg)	7590.0±2876.7	5744.9±1426.1	4730.9±912.4*	5809.1±1687.3
Potassium (mg)	3280.9±883.1	2584.8±485.0	1993.0±531.8**	2580.0±615.9
Zinc (mg)	9.2±2.5	8.5±1.5	7.1±1.3	8.4±1.7
Vitamin A (RE)	975.5±416.1	690.7±237.7	576.5±252.5	706.5±273.8
retinol	79.9±28.1	66.6±39.5	60.9±32.3	67.3±37.1
carotene	5013.8±2358.4	3568.7±1281.1	2887.0±1258.2	3634.6±1475.6
Vitamin B_1 (mg)	1.2±0.3	1.1±0.2	0.8±0.2*	1.0±0.2
Vitamin B_2 (mg)	1.3±0.4	1.0±0.2	0.8±0.2*	1.0±0.3
Vitamin B_6 (mg)	2.1±0.6	1.8±0.4	1.3±0.4*	1.7±0.5
Niacin (mg)	17.4±5.0	14.3±2.9	11.7±3.7*	14.3±3.5
Vitamin C (mg)	175.0±28.9	113.5±38.5	88.2±43.2*	116.8±43.6
Folate (mg)	297.8±89.4	243.6±55.8	195.7±38.1*	243.0±61.9
Vitamin E (mg)	10.0±3.3	9.7±2.5	6.6±3.9	9.3±2.9
Cholesterol (mg)	251.0±61.6	218.7±83.1	168.0±60.7	215.2±79.7

[1)]Mean ± SD
[2)]Significantly different between groups within female by ANOVA ($p < 0.05$)
[3)]Significantly different between groups within female by ANOVA ($p < 0.005$)

did not have problems moving, due to a reduced required energy intake that resulted in lower energy consumption (19).

Significant distributional differences from the DRIs were categorized according to the moving status of the patients, as summarized in Table 11.

Among the male patients, the patient group without problems moving and the patient group requiring movement aids had exceeded intakes of protein, phosphorus, iron, zinc, vitamin B_6, and vitamin C from the levels of the RIs, but their intakes of calcium, vitamin B_2, and folate were lower than the levels of the EARs. Among the female patients, the patient group without problems moving, the patient group requiring movement aids, and the disabled group all exceeded the intakes for protein, phosphorus, iron, zinc, vitamin B_6, vitamin C from the levels of RIs, but folate intake was lower than the level of the EAR, and calcium intake in 50% of the patient group without problems moving exceeded the level of the RI. However, 70.4% of the patient group that required movement aids, and 100% of the disabled patient group, had intakes lower than the level of the EAR. For the intake of vitamin B_2, 75% of the patient group without problems moving exceeded the level of the RI, but 92.6% and 100.0% of the patient group requiring movement aids and the disabled patient group had intakes lower than the level of the EAR, respectively.

Table 11. Classification for Dietary Reference Intakes of nutrients intakes of the subjects according to movement status

Nutrients	physical status	Male (N = 14)			Female (N = 36)		
		Nutrients intakes ≥ EAR	EAR < Nutrients intakes ≤ RI	RI < Nutrients intakes	Nutrients intakes ≥ EAR	EAR < Nutrients intakes ≤ RI	RI < Nutrients intakes
Protein	walking able	0(0.0)	0(0.0)	6(100.0)	0(0.0)	0(0.0)	4(100.0)
	assisting devices	0(0.0)	0(0.0)	8(100.0)	0(0.0)	2(7.4)	25(92.6)
	bed ridden	-	-	-	0(0.0)	1(20.0)	4(80.0)
Calcium	walking able	3(50.0)	2(33.3)	1(16.7)	1(25.0)	1(25.0)	2(50.0)
	assisting devices	5(62.5)	1(12.5)	2(25.0)	19(70.4)	7(25.9)	1(3.7)
	bed ridden	-	-	-	5(100.0)	0(0.0)	0(0.0)
Phosphorus	walking able	0(0.0)	0(0.0)	6(100.0)	4(100.0)	0(0.0)	0(0.0)
	assisting devices	0(0.0)	0(0.0)	8(100.0)	1(3.7)	1(3.7)	25(92.6)
	bed ridden	-	-	-	1(20.0)	2(40.0)	2(40.0)
Iron	walking able	0(0.0)	0(0.0)	6(100.0)	0(0.0)	0(0.0)	4(100.0)
	assisting devices	0(0.0)	0(0.0)	8(100.0)	0(0.0)	0(0.0)	27(100.0)
	bed ridden	-	-	-	1(20.0)	1(20.0)	3(60.0)
Zinc	walking able	0(0.0)	0(0.0)	6(100.0)	0(0.0)	1(25.0)	3(75.0)
	assisting devices	0(0.0)	0(0.0)	8(100.0)	2(7.4)	4(14.8)	21(77.8)
	bed ridden	-	-	-	1(20.0)	1(20.0)	3(60.0)
Vitamin A	walking able	1(16.7)	3(50.0)	2(33.3)	0(0.0)	1(25.0)	3(75.0)
	assisting devices	0(0.0)	4(50.0)	4(50.0)	2(7.4)	9(33.3)	16(59.3)
	bed ridden	-	-	-	1(20.0)	3(60.0)	1(20.0)
Vitamin B_1	walking able	1(16.7)	4(66.7)	1(16.7)	1(25.0)	0(0.0)	3(75.0)
	assisting devices	5(62.5)	0(0.0)	3(37.5)	12(44.4)	14(51.9)	2(7.4)
	bed ridden	-	-	-	4(80.0)	1(20.0)	0(0.0)
Vitamin B_2	walking able	5(83.3)	1(16.7)	0(0.0)	1(25.0)	0(0.0)	3(75.0)
	assisting devices	7(87.5)	0(0.0)	1(12.5)	15(55.6)	9(33.3)	3(11.1)
	bed ridden	-	-	-	5(100.0)	0(0.0)	0(0.0)
Vitamin B_6	walking able	1(16.7)	0(0.0)	5(83.3)	0(0.0)	0(0.0)	4(100.0)
	assisting devices	0(0.0)	1(12.5)	7(87.5)	4(14.8)	2(7.4)	21(77.8)
	bed ridden	-	-	-	2(40.0)	0(0.0)	3(60.0)
Niacin	walking able	0(0.0)	1(16.7)	5(83.3)	0(0.0)	1(25.0)	3(75.0)
	assisting devices	0(0.0)	4(50.0)	4(50.0)	2(7.4)	12(44.4)	13(48.1)
	bed ridden	-	-	-	24(0.0)	2(40.0)	1(20.0)
Vitamin C	walking able	1(16.7)	2(33.3)	3(50.0)	0(0.0)	0(0.0)	4(100.0)
	assisting devices	0(0.0)	2(25.0)	6(75.0)	3(11.1)	8(29.6)	16(59.3)
	bed ridden	-	-	-	3(60.0)	0(0.0)	2(40.0)
Folate	walkng able	5(83.3)	1(16.7)	0(0.0)	2(50.0)	2(50.0)	0(0.0)
	assisting devices	6(75.0)	2(25.0)	0(0.0)	25(92.6)	1(3.7)	1(3.7)
	bed ridden	-	-	-	5(100.0)	0(0.0)	0(0.0)

CONCLUSION

The current study investigated the 3 day nutrient intake status of 50 elderly dementia patients who were receiving general meals at a specialized hospital for the elderly located in Yongin, Kyunggi province. The study was proposed in order to investigate the effects on nutrient intake according to the factors of dementia type, self-feeding ability, and movement ability, which are thought to have effects on dietary intake.

1. The mean age of the male patients was 79.9 ± 6.5, and it was 80.5 ± 6.3 for the female patients. The mean heights were 169.5 ± 6.0 cm (males) and 154.6 ± 5.2 cm (females), and the mean weights were 58.5 ± 7.4 kg (males) and 51.7 ± 8.9 kg (females). The mean BMI of the male the patients was 20.6 ± 3.9, and it was 21.7 ± 3.6 for the female patients. The mean hospitalization period was 22.1 ± 20.7 months for the male patients and 21.4 ± 15.5 months for the female patients.

2. As for the factors related to dietary intake in the patients, dementia type, self-feeding ability, and movement ability were investigated. According to the types of dementia, the AD group and VD group in the male patients had significant differences in their intakes of vegetable protein, dietary fiber, total iron, and non-heme iron. In the case of the female patients, significant differences were found in the intakes of total protein, phosphorus, zinc, and vitamin B_6 between the AD and VD patient groups.

Between the patient group that could self-feed and the patient group requiring a caregiver for eating, the males showed significant differences in their intakes of animal-source calcium and carotene, but no significant difference was found in the female patients. For moving status, significant differences were found between the male dementia patient group without problems moving and the patient group requiring movement aids for their intakes of vegetable oil, vitamin A, and carotene. In the case of the female dementia patients, significant differences were found among all patient groups, including the female dementia patients without problems moving, the patient group requiring movement aids, and the disabled patient group, for the intakes of total protein, animal protein, dietary fiber, ash, total calcium, vegetable-source calcium, animal-source calcium, phosphorus, total iron, non-heme iron, heme iron, sodium, vitamin B_1, B_2, B_6, niacin, vitamin C, folate, and calcium.

The current study was conducted to investigate 50 hospitalized dementia patients receiving general meals at a specialized hospital for elderly people. There are limitations to this study in that normal elderly people were not included, and the study population of dementia patients was not large enough to be used to represent all dementia patients. However, the results of the investigation reveal that the protein intake of the patients was sufficient, while their intakes of calcium, vitamin B_2, and folate were insufficient. Also, movement ability was found to have an effect on nutrient intake. Thus, a substantial approach to improving excessive or insufficient nutrient intake in elderly dementia patients must be found, in order to prevent nutritional imbalances.

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