

Nutrient Intakes and Dietary Habits of Single Living Korean Adults by Age Group

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ABSTRACT

In order to investigate the differences in nutrient intakes and eating habits between people living alone and people living together with family or others by age group, dietary survey data of the subjects aged 20 years or older from 2001 Korean National Health and Nutrition Survey were analyzed. Living status of the subjects was defined as 'single' when the subjects' household member was one person. Age, gender, income, education were adjusted during the comparative analysis. The subjects living alone had diets with lower score of nutritional adequacy ratio and lower quality, and drank more alcoholic beverages when compared with the subjects living together. Females were more greatly affected in dietary intakes by living alone situation than males. Of the four age groups, a group with ages from 30 to 39 years showed less nutrient intake patterns in persons living alone than in persons living together, but the rest three groups with ages from 20 to 29, from 50 to 64, and 65 or older did not show any significant differences. Eating habits of the subjects living alone, such as skipping meals, kinds of snacks, dining-out, were worse as a whole than the other. In conclusion, single living particularly of females or of 30 to 39 years of age group had negative influences on dietary intakes and behavior. There may be statistical errors if socioeconomic and demographic factors such as age, gender, income, and education are not controlled in the population study investigating the effect of living alone on dietary intakes. Further studies will be needed to know the age-specific reasons for the worse nutrient intakes of single living persons. (*J Community Nutrition* 7(1) : 21~28, 2005)

KEY WORDS : living alone · nutrient intake · eating habits · adult age group · gender.

Introduction

There have been an increase in recent years, in the numbers of persons living alone in independent households. According to the Korean Population and Housing Census Report (Korean National Statistical Office 2001), the number of one-person household has been greatly increased from 4.8% in 1980 to 15.5% in 2000. Especially for the elderly, 16.2% of the total number with the age of 65 years or older were living alone in 2001.

The reasons for living alone may be varied depending on the age groups. For the young adults, commuting problems, independency from parents, and preference of single free

living may be the main reasons. Middle-aged adults, particularly males, live alone because of their children's study abroad with mothers, high rate of divorce, etc. The characteristics of present society such as internet, individualism, nuclear family, and change of family conception may continue to increase single person living alone more rapidly.

Living alone may increase the risk of a person's becoming lonely, isolated, or depressed, and thus may disturb the food choice in variety and adequate diets. The social and psychological factors surrounding living status probably have more influences on dietary intake than simply whether or not persons live alone (Terry 1993).

There were reported that persons who felt more lonely and unhappy had more insufficient diets than persons who were less lonely and unhappy (Kim 1998 ; Walker, Beauchene 1991). The analysis of a nation-wide survey data in the U. S. was shown that the quality of the diets was poorer for men living alone than for those living with spouses. Energy intakes of both males and females were lower in those who

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lived alone than in those living with spouses (Davis et al. 1990). However, other studies did not show such relationships between living alone and inadequate nutrient intake (Garry et al. 1982 ; Kim, Park 2000 ; Ryan, Bower 1989).

Several studies were also reported on the relationship of living alone to dietary inadequacy for the Korean elderly (Kim 1997 ; Kim 1998 ; Kim, Park 2000 ; Park, Son 2003 ; Lee et al. 2000) and for the college students (Choi et al. 2000 ; Park et al. 1995 ; Park et al. 2002). However, there were limited reports concerned with living arrangements and dietary intakes for other age groups such as middle-aged. Furthermore most studies were carried out in a small scale sample of specific living condition and regions.

Therefore in this study, using the latest nationwide survey data of 2001 Korean National Health and Nutrition Survey (KNHNS), the differences in nutrient intakes and eating habits between single-person living alone households and family households were investigated by four adult-age groups. It is expected that the results can be used as the basic data to develop and implement the nutrition programs for the people living alone at various age groups.

Subjects and Methods

1. Study subjects

The present study used the nutrition survey data of the 2001 Korean National Health and Nutrition Survey (KNHNS) conducted by the Ministry of Korean Health and Welfare, during November and December 2001. From the dietary survey sample of total 10,500 persons, the data of the subjects aged 20 years or older were analyzed.

Data of KNHNS nutrition survey were collected by specially trained dietitians and members of each household were interviewed at home. One-day food intake was surveyed by 24-hour recall method. Food portions were converted into weight according to the standard estimators. The daily nutrient intake was estimated on the basis of food composition table of Korean Office of Rural Development (2000).

Living status of the subjects was defined as 'living alone' when the subjects' household member was one person.

2. Nutrient intake evaluation

Energy and nutrient intake were evaluated on the basis of 2000 Korean recommended dietary allowances (RDA). The percentages against RDAs (RDA%) for all nutrients were

calculated and lipid intake multiplied by 9 kcal was expressed as the percent of energy intake (lipid-energy%). Mean adequacy ratios (MAR) of energy, protein, Ca, P, Fe, vitamin A, thiamin, riboflavin, niacin, and vitamin C were calculated. MAR is the mean value of the nutrient adequacy ratios (NARs) of energy and above 9 nutrients. For the above 9 nutrients, indices of nutritional quality (INQ) were estimated and the numbers of nutrient with its INQ lower than 1 (INQ<1) were counted (Lee, Nieman 1995 ; Lee et al. 2001 ; Lee, Cho 2004).

3. Statistical analysis

All the values were expressed as mean and standard deviation (SD) or frequency distribution and the percentage. Group differences of means were examined by t-test, ANOVA, ANCOVA, MANOVA, MANCOVA, or Chi-square test. All the statistical analyses were carried out using SPSS program (ver 11.0).

Results and Discussion

1. Nutrient intakes of total subjects by living status

Daily nutrient intakes and nutritional indices of the total subjects aged 20 years or older by living status were shown in Table 1. On the whole, according to the multivariate test of Pillai's Trace, adjusted with age, gender, education, and income level, daily intakes (RDA%) of energy, nutrients, drinking water, and alcohol beverage, and nutritional indices differed significantly between the subjects living alone and the subjects living together with others ($p=0.000$).

For an individual nutrient, adjusted with age, gender, education, and income level, only the intake amounts of thiamin and vitamin C and their RDA%, and possibly the RDA% of protein ($p = 0.057$) were significantly lower in those living alone than in those not living alone. Energy and the rest of nutrients did not differ between two groups. If age, gender, education, and income level were not controlled, intakes of energy and most nutrients showed significantly lower in persons living alone than persons living together. These results indicated that there may be statistical errors if socioeconomic and demographic factors such as age, gender, income, and education are not controlled in the population study investigating the effect of living alone itself on dietary intakes.

Nonetheless, the subjects living alone showed significantly

Table 1. Comparison of daily nutrient intakes and nutritional indices between living alone and living together subjects over 20 years of age

Nutrient	Living alone (n = 456)	Living together (n = 6521)	p-value	
			2)	3)
Energy (kcal)	1859.1 ± 926.5 ¹⁾	2066.4 ± 877.4	0.000	0.710
RDA%	91.0 ± 40.2	95.6 ± 37.9	0.012	0.443
Protein (g)	68.6 ± 63.3	76.6 ± 45.3	0.000	0.861
RDA%	105.9 ± 64.1	122.9 ± 67.2	0.000	0.057
Lipid (g)	32.6 ± 32.5	40.4 ± 36.5	0.000	0.483
Energy%	15.0 ± 9.7	16.9 ± 9.2	0.000	0.101
Carbohydrate (g)	304.5 ± 146.5	333.3 ± 133.4	0.000	0.061
Ca (mg)	471.0 ± 346.9	512.8 ± 339.0	0.011	0.430
RDA%	68.1 ± 49.4	73.4 ± 48.4	0.026	0.596
P (mg)	1097.3 ± 588.7	1237.7 ± 581.9	0.000	0.332
RDA%	156.8 ± 84.1	176.8 ± 83.1	0.000	0.332
Fe (mg)	12.2 ± 10.2	14.0 ± 24.5	0.001	0.166
RDA%	97.4 ± 83.7	103.1 ± 75.0	0.119	0.608
Na (mg)	5053.7 ± 3448.4	5553.7 ± 3363.9	0.002	0.091
/1000kcal	2849.8 ± 1768.0	2804.8 ± 1539.4	0.146	0.146
K (mg)	2716.9 ± 1592.2	3104.9 ± 1563.4	0.000	0.073
Vitamin A (μgRE)	567.7 ± 570.0	677.7 ± 740.7	0.007	0.284
RDA%	78.7 ± 77.0	96.6 ± 105.7	0.002	0.168
Thiamin (mg)	1.56 ± 7.2	1.62 ± 22.1	0.957	0.003
RDA%	99.6 ± 61.9	118.6 ± 74.5	0.000	0.013
Riboflavin (mg)	1.0 ± 0.7	1.2 ± 1.1	0.002	0.844
RDA%	76.7 ± 53.0	87.5 ± 52.0	0.000	0.571
Niacin (mg)	15.7 ± 11.2	18.5 ± 12.8	0.000	0.329
RDA%	110.2 ± 73.1	126.8 ± 78.3	0.000	0.062
Vitamin C (mg)	117.2 ± 122.2	144.3 ± 120.6	0.000	0.000
RDA%	168.1 ± 174.1	206.2 ± 172.3	0.000	0.000
Drinking water (ml)	840.4 ± 452.7	870.2 ± 472.2	0.190	0.386
Alcohol beverage (g)	11.2 ± 36.9	7.4 ± 26.4	0.004	0.000
MAR	0.74 ± 0.21	0.81 ± 0.17	0.000	0.000
Nutrient's number of INQ < 1	4.58 ± 2.38	3.71 ± 2.06	0.000	0.000
Multivariate test-Pillai's Trace ⁴⁾			0.000	0.000

¹⁾ Mean ± SD²⁾ ANOVA³⁾ ANCOVA adjusted with age, gender, education, and income level⁴⁾ Multivariate test with the RDA% of 10 nutrients, lipid-energy%, Na/1000kcal, drinking water, alcohol beverage, MAR, and Nutrient's number of INQ < 1

lower MAR (0.74 versus 0.81) and higher numbers of nutrients with INQ lower than 1 (4.58 versus 3.71) than those for the subjects living with others even though age, gender, education, and income level were adjusted. MAR is known to reflect the overall nutrient intake adequacy of an individual diet, and MAR of less than 0.75 could be regarded as inadequate diet since the RDA% of 75 is usually used as a cutoff point in determining inadequacy of a nutrient intake in Korea. INQ is used as an index of nutrient density that allows the

quality of a nutrient per 1,000 kcal in a diet. A daily diet with overall INQs greater than 1 is generally considered to be of good quality, which means the diet provides important nutrients in excess of calories. On the contrary, a diet supplying calories in excess of nutrients would have an INQ less than 1.

Therefore above results suggested persons living alone had diets with lower score of nutritional adequacy ratio and lower quality, and drank more alcoholic beverages, when compared with persons living together. Living alone may be

Table 2. Daily nutrient intakes and nutritional indices by living status and gender of the subjects over 20 years of age

Nutrient	Male				Female			
	Living alone (n = 157)	Living together (n = 3041)	p-value		Living alone (n = 299)	Living together (n = 3480)	p-value	
			³⁾	⁴⁾			³⁾	⁴⁾
Energy % ¹⁾	99.9 ± 43.8 ²⁾	97.1 ± 38.3	0.381	0.348	86.3 ± 37.5	94.3 ± 37.5	0.000	0.118
Protein %	122.1 ± 72.3	125.7 ± 65.2	0.509	0.594	97.4 ± 57.7	120.6 ± 68.8	0.000	0.049
Lipid-energy%	18.2 ± 9.8	17.5 ± 9.3	0.360	0.316	13.4 ± 9.3	16.3 ± 9.0	0.000	0.156
Ca %	77.2 ± 45.5	79.6 ± 52.2	0.564	0.637	63.4 ± 50.7	67.9 ± 44.1	0.093	0.693
Fe %	113.0 ± 76.9	124.4 ± 77.6	0.073	0.104	89.2 ± 86.0	84.5 ± 67.4	0.260	0.502
Na/1000kcal	2709 ± 1379	2754 ± 1397	0.696	0.718	2924 ± 1940	2849 ± 1653	0.461	0.105
Vitamin A %	105.1 ± 96.6	106.2 ± 114.1	0.805	0.802	64.9 ± 60.1	88.2 ± 96.9	0.000	0.038
Riboflavin %	91.7 ± 60.3	89.2 ± 54.7	0.586	0.518	68.9 ± 47.0	85.9 ± 49.6	0.000	0.407
Vitamin C %	185.1 ± 180.8	194.8 ± 158.0	0.458	0.500	159.2 ± 170.2	216.2 ± 183.3	0.000	0.000
Drinking water (ml)	1005 ± 498	977 ± 512	0.505	0.566	754 ± 402	777 ± 413	0.356	0.822
Alcohol beverage (g)	18.7 ± 40.7	12.9 ± 34.7	0.044	0.060	7.3 ± 34.1	2.6 ± 14.2	0.000	0.000
MAR	0.81 ± 0.18	0.84 ± 0.16	0.040	0.060	0.71 ± 0.22	0.79 ± 0.18	0.000	0.001
Nutrient's number of INQ < 1	3.80 ± 2.42	3.37 ± 2.10	0.010	0.028	4.99 ± 2.26	4.00 ± 1.98	0.000	0.000
Multivariate test- Pillai's Trace			0.015	0.182			0.000	0.000

¹⁾ RDA%²⁾ Mean ± SD³⁾ ANOVA⁴⁾ ANCOVA adjusted with age, education, and income level

more associated with eating alone, loneliness, depressed, and social isolation, and thus may disturb the food choice in variety and adequate diets. The social and psychological factors that surround living alone condition probably have more influences on dietary intake than simply whether or not persons live alone (Terry 1993).

2. Nutrient intakes according to the living status by gender

Table 2 shows the effect of gender on the nutrient intakes as RDA% and nutritional indices according to the living status with and without adjusting of age, education, and income level. Through the multivariate test, the significant differences of nutrient intakes, etc. as a whole, between two living conditions were appeared in both male and female subjects, but when adjusted with age, education, and income level, the differences was disappeared for the male subjects ($p=0.182$) while remained for the female subjects ($p=0.000$). However, the number of nutrient with $INQ < 1$ was significantly more in the male living alone than in the male not living alone. MAR was possibly lower ($p=0.60$) and alcohol drink seemed to be higher ($p=0.60$) in men living alone, compared with men living together.

For the female, even though adjusted with age, education, and income level, intakes of protein and vitamins A and C, MAR, and the number of nutrient with $INQ < 1$ were sig-

nificantly poorer in single living women than in women living together with families. The intake amount of alcohols was more in single living women. The above data indicated that the female adult was more greatly affected in dietary intakes by living alone than the male adult. This may be partly because of the emotional sensitivity of females.

3. Nutrient intakes according to the living status by age group

In order to find out which age group was mostly affected by living alone condition, four age groups of from 20 to 29 years (20 - 29), from 30 to 49 years (30 - 49), from 50 to 64 years (50 - 64), and 65 years or older (65+) were analyzed for their nutrient intake pattern according to the living condition. The results are shown in Table 3.

When gender, education, and income were not adjusted, the three groups with ages of 30 years or older showed overall differences of nutrient intake pattern between persons living alone and persons not living alone (multivariate tests-Pillai's Trace : $p=0.001 - 0.043$).

But the 20 - 29 age group did not show a significant difference between two groups ($p=0.272$). It was suggested that persons of twenties did not significantly depend on the living status-live alone or not, for their dietary intakes except alcohol drink. It might be due to their dynamic life style. A study of self-boarded college male student showed a result

Table 3. Daily nutrient intakes and nutritional indices by living status and age group

Nutrient	20 – 29 years				30 – 49 years			
	Living alone (N = 70)	Living together (N = 1186)	p-value		Living alone (N = 122)	Living together (N = 3284)	p-value	
			³⁾	⁴⁾			³⁾	⁴⁾
Energy % ¹⁾	95.2 ± 38.0 ²⁾	94.3 ± 40.9	0.846	0.872	100.0 ± 46.0	97.8 ± 37.9	0.524	0.465
Protein %	124.3 ± 57.5	124.4 ± 75.2	0.991	0.998	128. ± 78.0	131.7 ± 67.9	0.582	0.690
Lipid-energy%	21.8 ± 11.1	20.1 ± 9.2	0.126	0.079	18.6 ± 9.9	18.0 ± 9.1	0.504	0.395
Ca %	69.7 ± 38.9	70.0 ± 42.5	0.968	0.841	76.9 ± 46.0	76.6 ± 49.5	0.948	0.842
Fe %	94.3 ± 71.8	89.1 ± 61.5	0.501	0.811	103.0 ± 72.7	105.2 ± 76.7	0.755	0.297
Na/1000kcal	2417 ± 1358	2560 ± 1249	0.352	0.239	2680 ± 1465	2758 ± 1452	0.558	0.580
Vitamin A %	101.8 ± 86.5	95.6 ± 91.6	0.584	0.702	109.3 ± 95.0	104.6 ± 108.7	0.642	0.784
Riboflavin %	93.7 ± 45.9	93.0 ± 51.0	0.919	0.906	98.8 ± 66.6	92.6 ± 53.3	0.217	0.155
Vitamin C %	167.8 ± 202.0	196.7 ± 171.0	0.175	0.175	200.9 ± 193.9	217.7 ± 175.1	0.302	0.302
Drinking water (ml)	963 ± 562	912 ± 524	0.429	0.604	913 ± 465	890 ± 480	0.604	0.945
Alcohol beverage (g)	15.8 ± 48.6	6.3 ± 24.9	0.004	0.010	18.9 ± 41.5	8.2 ± 27.8	0.000	0.000
MAR	0.81 ± 0.18	0.80 ± 0.17	0.795	0.807	0.81 ± 0.18	0.84 ± 0.16	0.117	0.080
Nutrient's number of INQ < 1	3.74 ± 2.10	3.62 ± 1.89	0.632	0.564	3.61 ± 2.31	3.40 ± 1.95	0.311	0.187
Multivariate test- Pillai's Trace			0.272	0.344			0.001	0.002
Nutrient	50 – 64 years				65+ years			
	Living alone (N = 90)	Living together (N = 1310)	p-value		Living alone (N = 174)	Living together (N = 741)	p-value	
			³⁾	⁴⁾			³⁾	⁴⁾
Energy % ¹⁾	89.0 ± 33.4 ²⁾	93.9 ± 35.1	0.195	0.340	83.9 ± 38.9	91.0 ± 37.3	0.025	0.544
Protein %	103.1 ± 54.1	114.8 ± 59.4	0.069	0.180	84.3 ± 52.7	96.2 ± 53.4	0.008	0.461
Lipid-energy%	13.0 ± 7.4	13.6 ± 7.9	0.429	0.883	10.9 ± 7.5	12.3 ± 8.1	0.037	0.836
Ca %	78.3 ± 63.7	73.9 ± 48.5	0.413	0.190	56.1 ± 44.5	63.6 ± 50.5	0.069	0.686
Fe %	119.6 ± 117.1	113.9 ± 76.7	0.508	0.269	83.2 ± 71.5	97.0 ± 80.7	0.038	0.373
Na/1000kcal	2981 ± 1526	2986 ± 1724	0.980	0.689	3076 ± 2152	3083 ± 1879	0.965	0.530
Vitamin A %	75.0 ± 69.6	93.3 ± 111.2	0.276	0.406	49.9 ± 45.7	68.7 ± 97.9	0.014	0.285
Riboflavin %	73.3 ± 44.3	80.7 ± 47.3	0.149	0.437	56.2 ± 39.4	67.4 ± 50.0	0.006	0.979
Vitamin C %	181.3 ± 154.2	209.2 ± 173.1	0.136	0.136	138.5 ± 152.3	165.5 ± 152.6	0.036	0.036
Drinking water (ml)	824 ± 419	838 ± 424	0.774	0.703	748 ± 392	773 ± 413	0.473	0.401
Alcohol beverage (g)	4.2 ± 15.3	8.1 ± 27.9	0.191	0.365	7.6 ± 34.8	4.5 ± 17.9	0.101	0.015
MAR	0.76 ± 0.20	0.81 ± 0.18	0.036	0.238	0.65 ± 0.22	0.72 ± 0.20	0.000	0.095
Nutrient's number of INQ < 1	4.27 ± 2.29	3.80 ± 2.09	0.030	0.216	5.75 ± 2.08	5.02 ± 2.19	0.000	0.145
Multivariate test- Pillai's Trace			0.043	0.127			0.002	0.279

¹⁾RDA%²⁾Mean ± SD³⁾ANOVA⁴⁾ANCOVA adjusted with gender, education, and income level

that only iron nutrition was worse in single living students than in students living with roommates (Park et al. 2002). Other nutrient intakes were not different between two groups, which agreed with the results of this study.

Although multivariate test showed an overall significance of difference between two living status, all the nutrient intakes and nutritional indices of 30 – 49 age group did not show any significant differences. Only alcohol drinking was

much higher in those living alone ($p = 0.00$), which might play an important part in appearing the significance of multivariate test. In the age group of 50 – 64 MAR, the number of nutrient with $INQ < 1$, and possibly protein ($p = 0.069$) were worse in single living subjects than in the other group. However single living elderly of 65+ age group showed lower intakes of most nutrients and poorer nutritional indices than the elderly living with families or others. Several studies

were reported on the relationship of living alone to dietary inadequacy for the elderly (Kim 1997 ; Kim 1998 ; Park & Son 2003 ; Lee et al. 2000). There may be many reasons for the poor dietary status of the elderly living alone. For example, the loss of spouses, physical frailty and increasing disability due to a variety of chronic diseases make preparing meals difficult or impossible for some one. The causes of inadequate intake need to be examined in economic, physical, psychological, or educational views to improve or maintain the nutritional status of the elderly. From the study of

Kim (1998) living-alone elderly showed lower happiness score than elderly living with others and the happiness score, in turn, was positively correlated with energy and protein intakes of elderly. Loss of happiness may decrease appetite and desire to prepare foods, which result in limited food intakes and poorer nutritional status.

However, if gender, education, and income levels were adjusted, statistical significances of difference in general nutrient intake patterns between two living status groups were disappeared in both 50 – 64 and 65+ age groups ($p = 0.127$

Table 4. Dietary habits by living status of the subjects over 20 years of age

Dietary habits		Living alone (n = 456)		Living together (n = 6544)		p-value
Rate of skipped meal (%)	Breakfast	24.1 ± 40.7 ¹⁾		20.3 ± 37.5		0.038 ⁴⁾
	Lunch	8.8 ± 25.2		5.5 ± 19.8		0.001
	Supper	7.8 ± 23.2		4.0 ± 16.6		0.000
Snacking frequency	≥ 3 times per day	48 ²⁾	10.6 ³⁾	652	10.0	0.000 ⁵⁾
	2 times per day	78	17.2	1446	22.1	
	Once per day	170	37.5	2747	42.0	
	Almost not	157	34.7	1693	25.9	
	Sub-total	453	100.0	6538	100.0	
Kind of snacks	Cookie and snack	30	10.0	419	8.6	0.000
	Bread and cake	27	9.0	299	6.2	
	Dduk and Ddukbokgi	7	2.3	104	2.1	
	Ramyeon	12	4.0	169	3.5	
	Noodles	3	1.0	46	0.9	
	Fruit and fruit juice	112	37.5	2532	52.2	
	Beverage	86	28.8	1013	20.9	
	Milk and milk product	22	7.4	251	5.2	
	Fried food	0	0.0	18	0.4	
Sub-total	299	100.0	4851	100.0		
Frequency of eating away from home	≥ 2 times per day	62	13.7	382	5.8	0.000
	1 times per day	80	17.7	1484	22.7	
	≥ 1 time per week	81	18.0	1606	24.6	
	≥ 1 time per month	57	12.6	1487	22.7	
	Almost not	171	37.9	1578	24.1	
Sub-total	451	100.0	6537	100.0		
Frequency of eating fried foods	≥ 1 time per day	6	1.3	125	1.9	0.000
	≥ 1 time per week	80	17.7	1631	24.9	
	≥ 1 time per month	70	15.5	1809	27.7	
	Almost not	297	65.6	2977	45.5	
Sub-total	453	100.0	6542	100.0		
Vitamin-mineral supplement	Yes	99	22.0	1433	21.9	0.990
	No	352	78.0	5103	78.1	
	Sub-total	451	100.0	6536	100.0	
Healthy functional foods	Yes	62	13.6	956	14.6	0.552
	No	394	86.4	5587	85.4	
	Sub-total	456	100.0	6543	100.0	

¹⁾ Mean ± SD

²⁾ N

³⁾ (%)

⁴⁾ t-test

⁵⁾ Chi-square test

and 0.279, respectively). It could be assumed that living alone persons of both 50 – 64 and 65+ age groups had worse conditions of income and education and were composed more of females, which resulted in poorer nutrient intakes. Thus further precise analysis is needed to figure the correct reasons out.

In 30 – 49 age group, the significance of difference in nutrient intakes between two living status was still maintained ($p = 0.002$) even when gender, education, and income were controlled. Higher alcohol drinking ($p = 0.000$) and maybe MAR ($p = 0.080$) seemed to play roles in maintaining the significance of difference between two living status. For middle aged adults of 30 – 49 years, other factors besides of income, education, and gender, may affect nutrient intakes and alcohol drinking significantly. Dietary and living care of the spouse or other family members could be an important factor to have better nutritional status for those living together when compared with those living alone. Since females were more affected by living alone in dietary intakes (Table 2), if the comparative analysis of nutrient intakes according to the living status by both age and gender were done, some different meaningful findings may come out.

4. Eating habits by living status

Several eating habits such as skipping meals, snacking, dining-out, fried foods intake, and intakes of vitamin and mineral supplements, and consumption of functional foods were compared between the two living status groups.

As presented in Table 4, the skipping rates of three meals were all significantly higher in the group of living alone than the group not living alone. Eating away from home was also more frequent in the group of living alone than the other. Living alone group took more beverages, bread and cake, and cookie and snack, but less fruit and fruit juice and fried foods, compared with group living with others. However, they had snacking less frequently than group living with others, and they took more milk and milk product, than persons living together. Living alone persons seemed to take foods which were easy to buy or to convenient to cook. There were similar in the ratios of taking vitamin-mineral supplement and consuming healthy functional foods between two groups.

As a whole, eating habits of persons living alone were worse than persons not living alone, although their snacking frequency was less. Since the results of eating habits were

not adjusted with demographic and socioeconomic factors, the eating habits of two living status group, shown in above, may be biased by different group distributions of age, gender, etc. Thus, in order to investigate the effect of living alone itself on dietary habits, further studies should be carried out using subdivided subject samples by age or gender.

Conclusions

Using nationwide data of 2001 KNHNS, the differences in nutrient intakes and several eating habits between single-person living alone households and family households by different four adult-age groups were investigated. Age, income, education were adjusted during the comparative analysis. The results were as follows :

1) The subjects living alone had diets with lower score of nutritional adequacy ratio (mean MAR 0.74) and lower quality, and drank more alcoholic beverages, compared with the subjects living together.

2) Female adults were more greatly affected in dietary intakes by living alone situation than male adults.

3) Of the four age groups, a group of ages from 30 to 39 years showed less nutrient intake patterns in persons living alone than in persons living together, but the rest three groups with ages from 20 to 29, from 50 to 64, and 65 or older did not show any significant differences. If gender, income, and education were not adjusted three age groups with ages of 30 years or older showed overall differences of nutrient intakes between persons living alone and persons living together. However, persons aged from 20 to 29 years did not differ in nutrient intakes between two living status regardless of adjusting age, gender, income, and education .

4) Eating habits, such as skipping meals, kinds of snacking foods, dining-out, of persons living alone were worse as a whole than persons not living alone.

In conclusion , single living particularly for females or for 30 to 39 years of age group had negative influences on dietary intakes and behavior. For the twenties and elderly, socioeconomic factors such as gender or income may have important influences on dietary intake than simply whether or not persons live alone. There may be statistical errors if socioeconomic and demographic factors such as age, gender, income, and education are not controlled in the population study investigating the effect of living alone itself on dietary intakes. Further studies will be needed to prepare basal data

such as age-specific reasons for the worse nutrient intakes of persons living alone to develop the nutrition program of living status.

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