Food and Nutrient Intake in Relation to Alcohol Consumption in the Korean National Health and Nutrition Survey

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ABSTRACT

Dietary pattern in relation to alcohol consumption was studied in 7,370 Korean adults, aged 20 years and older, in 1998 Korean National Health and Nutrition Survey, in which 24 hour recall method was used for dietary survey. The aim of this study was to investigate the effect of alcohol consumption on food and nutrient intake among Koreans. Individual drinking data was collected by interview as a part of health behavior survey. T-test was adopted to test differences in nutrient and food intake between drinkers and non-drinkers. Chi-square test was used to test the association between nutrient intake level and drinking status. Drinkers of both sexes showed less consumption of foods from vegetable origins than non-drinkers. Consequently, They also had significantly less carbohydrate consumption than non-drinkers. This result may suggest that the diets of Korean drinkers is unbalanced in terms of low consumption of food from vegetable origin and carbohydrate. Nutrition education should focus on those issues to improve the nutritional status and prevent potential risk of disease by unbalanced diet. (*J Community Nutrition* 3(1) : 53~58, 2001)

KEY WORDS : food consumption · nutrient consumption · drinking status · National Nutrition Survey.

Introduction

In many epidemiolgic studies from Europe and America, moderate consumption of alcohol has been shown to have a lower risk of coronary heart disease(Marmot 1984, Rohan 1984, Moor & peterson1986, Veenstra 1991). Nevertheless negative effect of dietary habit such as irregularity of meals and consequent unbalanced nutrient intake have been put forward to be more widely discussed(Windham et al. 1983 ; Bebb et al. 1971). An alternative explanation might be that the moderate alcohol consumption is associated with healthy dietary habit. However, Less well documented is the relationship between alcohol intake and diet among moderate consumers, a much larger sector of the population. Results of the studies(Hillers et al. 1985 ; Ferro-Luzzi 1988) suggest that moderate drinkers tend to report lower intake of all macronutrients and of several vitamins. Although the observed nutritional imbalances seem relatively minor, those observations are intriguing because epidemiological reports consistently indicate that moderate alcohol consumption reduces mortality from coronary heart disease(CHD). Jones et al.(1982) suggested that the observed protection from CHD may be related to a small, but persistent, reduction in fat and carbohydrate intake among drinkers or to an increased HDL/LDL cholesterol. The aim of this study was to investigate the relationship between alcohol consumption status and food and nutrient intake of Korean adults to provide the basic information for nutrition policy for health promotion of Koreans. In this study, we investigated the dietary correlates of drinking from a large representative sample of the Korean population who participated in a 1998 Korean National Health and Nutrition Survey(KNHANS).

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Subjects and Methods

1. Study subjects

The study subjects participated in the Korean National Health and Nutrition Survey(Korean Health Industry Development Institute 1999 ; Ministry of Health and Welfare 1999), which was conducted in Novem-

ber and December 1998. The survey sample comprised of 11,525 persons(3,799 households) representing a Korean population of 1 year and older.

For present analyses, we utilized the data only from 7,370 adults aged 20 years and older.

2. Data collection & processing

The 1998 Korean National Health and Nutrition Survey(KNHANS) consisted of four parts of the survey including 1) health interview survey on disease prevalence and health care service utilization 2) health examination survey on 6 major degenerative diseases 3) health behavior survey on smoking, drinking, exercise and sleeping and 4) nutrition survey.

Specially trained interviewers had conducted health behavior survey on drinking, smoking, exercise and sleeping with the structured questionnaire. The questionnaire was designed specially to estimate alcohol consumption of people living in Korea. For the nutrition survey, 24 hour recall method had been used by trained dieticians. Subjects were interviewed at their homes. Food portions were converted into weight according to standard estimators. Foods were subsequently grouped into 18 categories. Nutrient consumption was estimated using the food composition table published by the National Rural Living Science Institute (1996).

3. Statistical analysis

In analysis, subjects were categorized into drinkers and non-drinkers. The data was approximately, normally distributed for the most measures. Age variable bad been adjusted with standardization of subject number in each age group. T-test was used to test the differences in food and nutrient intakes between the two groups. Chi-square test was used to test the association between nutrient intake and drinking status of the subjects. In all statistical testing performed, the null hypothesis was rejected at $p < 0.05$.

Table 1. Distribution of study subject by age and sex

Unit : number(%)

Variable	Male	Female	Total
Age(years)			
20 - 29	653(8.86)	766(10.39)	1419(19.25)
30 - 39	922(12.51)	944(12.81)	1866(25.32)
40 - 49	720(9.77)	741(10.05)	1461(19.82)
50 - 59	511(6.93)	593(8.05)	1104(14.98)
60 - 64	242(3.28)	304(4.12)	546(7.41)
≥ 65	378(5.13)	596(8.09)	974(13.22)
Total	3426(46.49)	3944(53.51)	7370(100.00)

Results & Discussion

Table 1 shows the distribution of study subjects by age and sex. Out of 7,370 subjects, 46.5% were male and 53.5% were female. This sex distribution agrees within 3% with that of the Korean population in this age group(National Statistical Office 1998). The strength of the 1998 Korean National Health and Nutrient Survey is that the population studied is representative of the Korean population with respect to gender, age and socio-demographic characteristics. Therefore food intake and alcohol consumption data reflect the real situation of the Korean dietary and drinking pattern. Initially, drinking status was classified into 3 categories of drinker, which include drinker, ex-drinker and abstainer.

As shown in Table 2, 81.5% of the male and 52.1% of the female subjects belonged to the drinker category. The proportion of drinkers was higher than that of the Hawaiian study(Marchand et al. 1989) which was 36% of male and 12% of female, or the Dutch study(Veenstra et al. 1993) which was 58% of male and 37% of female. But the proportion was lower than that of Italian women's study(Toniolo et al. 1991), which was 69.7%. Such relatively high proportion of drinkers in our population compared to Hawaiian or Dutch might be the result of the less strict definition of drinkers in our study which included frequent drinkers, heavy drinkers and occasional drinkers, whereas Hawaiian and Dutch study used a more conservative definition for drinking as regular consumption of at least one alcoholic drink per week. However, ex-drinkers were classified as non-drinkers. In the following analysis, the subjects were

Table 2. Distribution of male and female subjects by drinking status

Unit : number(%)

Drinking Status	Sex		
	Male(n=3305)	Female(n=3856)	Total(n=7161)
Drinker	2693(81.5%)	2010(52.1%)	4703(65.7%)
Non-drinker	612(18.5%)	1846(47.9%)	2458(34.3%)
Total	3305(100.0%)	3856(100.0%)	7161(100.0%)

Table 3. Mean nutrient intake and intake level based on RDA of study subjects (% RDA)

Nutrient	Male(n=3305)	Female(n=3865)	Total(n=7161)
Energy(kcal)	2262.38 ± 16.69 (94.29 ± 0.67)	1782.58 ± 12.17 (92.34 ± 0.61)	2005.62 ± 10.50 (93.25 ± 0.45)
Protein(g)	87.45 ± 1.07 (125.82 ± 1.53)	66.88 ± 0.81 (121.61 ± 1.47)	76.44 ± 0.67 (123.57 ± 1.06)
Fat(g)	43.41 ± 0.69	32.16 ± 0.44	37.39 ± 0.40
Carbohydrates(g)	362.99 ± 2.49	309.01 ± 2.10	334.11 ± 1.64
*C : P : F ratio	66.8 : 16.2 : 17.0	70.4 : 14.7 : 14.9	68.7 : 15.4 : 15.9
Fiber(g)	7.94 ± 0.09	6.81 ± 0.07	7.34 ± 0.05
Calcium(mg)	548.11 ± 7.13 (78.30 ± 1.01)	465.12 ± 5.84 (66.44 ± 0.83)	503.70 ± 4.58 (71.95 ± 0.65)
Phosphorus(mg)	1232.27 ± 11.07 (176.03 ± 1.58)	969.90 ± 7.72 (138.55 ± 1.10)	1091.87 ± 6.77 (155.98 ± 0.96)
Iron(mg)	14.65 ± 0.15 (122.11 ± 1.31)	11.91 ± 0.13 (82.93 ± 0.96)	13.18 ± 0.10 (101.14 ± 0.83)
Sodium(mg)	4668.77 ± 84.53	4378.99 ± 46.78	4978.55 ± 47.18
Potassium(mg)	2922.31 ± 27.08	2452.05 ± 23.45	2670.66 ± 17.98
Vitamin B_1(mg)	1.49 ± 0.01 (119.67 ± 1.26)	1.18 ± 0.01 (118.02 ± 1.13)	1.32 ± 0.01 (118.78 ± 0.84)
Vitamin B_2(mg)	1.17 ± 0.01 (80.50 ± 1.07)	0.92 ± 0.01 (77.37 ± 0.87)	1.04 ± 0.01 (78.82 ± 0.68)
Niacin(mg)	19.08 ± 0.26 (117.79 ± 1.60)	14.39 ± 0.15 (110.75 ± 1.18)	16.57 ± 0.15 (114.02 ± 0.97)
Vitamin C(mg)	127.36 ± 1.82 (181.95 ± 2.60)	129.21 ± 1.91 (184.59 ± 2.73)	128.35 ± 1.33 (183.36 ± 1.90)

mean ± SE : adjusted with age
* : C : P : F = Carbohydrates : Protein : Fat

Table 4-1. Mean per capita food intake by alcohol consumption status(Male)

Food	Alcohol consumption status		Significance(p)
	Non-drinker(n=612)	Drinker(n=2693)	
Cereals & grain products	370.11 ± 4.49	398.72 ± 6.16	0.0001***
Potatoes & starches	88.30 ± 7.37	126.37 ± 9.78	0.0009***
Sugars & sweets	10.57 ± 0.51	11.70 ± 0.65	0.1441
Pulse & pulse products	59.65 ± 2.34	63.99 ± 3.22	0.2592
Nuts & seeds	8.15 ± 0.93	8.01 ± 1.22	0.9221
Vegetables	365.88 ± 5.00	357.44 ± 6.87	0.3083
Fungi & mushrooms	22.50 ± 2.33	20.84 ± 3.00	0.6192
Fruits	313.13 ± 11.35	387.24 ± 14.75	0.0001***
Seaweeds	18.29 ± 1.30	18.46 ± 1.71	0.9334
Beverages	303.77 ± 14.45	119.77 ± 21.80	0.0001***
Seasoning	33.30 ± 0.79	31.77 ± 1.08	0.2401
Oil & fat(vegetable origin)	8.41 ± 0.35	8.30 ± 0.48	0.8621
Total(vegetable origin)	1197.54 ± 14.75	1164.54 ± 20.26	0.1768
Meats & meats products	120.84 ± 4.07	97.78 ± 5.58	0.0004***
Eggs	47.12 ± 1.95	45.80 ± 2.49	0.6523
Fishes & shellfishes	94.48 ± 4.58	86.42 ± 6.29	0.2835
Milk & milk products	200.20 ± 8.38	212.98 ± 10.76	0.3049
Oil & fat(animal origin)	0.08 ± 0.02	0.04 ± 0.03	0.4188
Total(animal origin)	219.21 ± 5.57	197.47 ± 7.64	0.0184*

* : $p < 0.05$: *** : $p < 0.001$

classified into only two categories of drinkers and non-drinkers.

Table 3 shows the mean nutrient intake for the study subjects. Compared with the recommended dietary allowances(RDA) for Koreans of each age group, both sexes of subjects consumed less than RDA in energy, calcium and vitamin A. In case of female subjects, energy derived from carbohydrates, protein, and fat was 70%, 15%, and 15% respectively. Male subjects also showed similar results. This ratio may imply that the Korean diet still heavily depends on carbohydrates as a source of energy compared to the American diet value of 46%(U.S. Department of Health and Human Services, 1989).

Table 4-1 shows average consumption of selected food groups by drinking status for male subjects. Drinkers consumed significantly less grain, potato and fruits and more beverage and foods from animal origin, including meat, than the non-drinker.

In case of female subjects, drinkers consumed significantly less grain and more food from vegetable origins including fruit and beverages(Table 4-2). There was no significant differences in intake of food from animal origin.

Table 5-1 shows mean nutrient intake for drinkers and non-drinkers in male subjects, after adjusting for age. Drinkers showed significantly less consumption of carbohydrates, fiber and vitamin C than that of non-drinkers.

On the other hand, female drinkers(Table 5-2) had a significantly less consumption of energy from carbohydrate, there were no significant differences in consumption of other nutrients between the two groups.

Summarizing the results for both sexes, drinkers tend to consume less food from vegetable origin such as grains, potatoes, and fruits and consume more beverages, and foods from animal origin. Drinkers also had significantly less consumption of carbohydrates and fiber.

Such tendency was more significant in male than that of female drinkers. For both sexes, less drinkers belonged to the optimal intake category of energy and iron than non-drinkers. These results imply that the unbalanced dietary pattern of Korean drinkers, in terms of lack of food from vegetable origin and carbohydrate and unbalanced intake of energy and iron. It may increase the risk of degenerative diseases caused by such unbalanced diets.

Table 4-2. Mean per capita food intake by alcohol consumption status(Female)

Food	Alcohol consumption status		Significance(p)
	Non-drinker(n=1846)	Drinker(n=2010)	
Cereals & grain products	368.07 ± 5.21	322.05 ± 3.16	0.0185*
Potatoes & starches	113.14 ± 10.32	119.76 ± 6.46	0.5661
Sugars & sweets	9.62 ± 0.60	7.91 ± 0.38	0.0091**
Pulse & pulse products	44.48 ± 2.64	47.70 ± 1.60	0.2806
Nuts & seeds	6.88 ± 1.36	8.02 ± 0.85	0.4449
Vegetables	295.14 ± 7.13	298.60 ± 4.33	0.6701
Fungi & mushrooms	24.33 ± 3.19	20.98 ± 2.03	0.3142
Fruits	377.81 ± 14.85	344.91 ± 9.07	0.0438*
Seaweeds	17.57 ± 1.68	16.98 ± 1.06	0.7480
Beverages	172.74 ± 9.93	89.48 ± 7.45	0.0001***
Seasoning	24.93 ± 0.85	23.98 ± 0.52	0.3242
Oil & fat(vegetable origin)	6.48 ± 0.33	5.74 ± 0.20	0.0515
Total(vegetable origin)	1014.62 ± 16.80	971.62 ± 10.20	0.0247*
Meats & meats products	85.64 ± 4.28	81.61 ± 2.78	0.4049
Eggs	35.93 ± 2.34	37.03 ± 1.57	0.6578
Fishes & shellfishes	69.01 ± 4.10	70.34 ± 2.51	0.7744
Milk & milk products	206.97 ± 9.78	202.57 ± 6.13	0.6628
Oil & fat(animal origin)	0.06 ± 0.04	0.09 ± 0.02	0.4919
Total(animal origin)	156.67 ± 5.71	161.28 ± 3.46	0.4785

* : $p < 0.05$: ** : $p < 0.01$: *** : $p < 0.001$

Table 5-1. Mean per capita nutrient intake by alcohol consumption status(Male)

Nutrient	Alcohol consumption status		Significance(p)
	Non-drinker(n=612)	Drinker(n=2693)	
Energy(kcal)	2200.21 ± 22.09	2180.37 ± 30.32	0.7051
Protein(g)	84.45 ± 1.44	82.84 ± 1.98	0.5000
Fat(g)	40.71 ± 0.91	38.45 ± 1.26	0.1364
Carbohydrates(g)	346.81 ± 3.31	378.25 ± 4.54	0.0001***
Energy from carbohydrates(%)	65.27 ± 0.29	70.15 ± 0.39	0.0001***
Energy from protein(%)	15.19 ± 0.19	15.18 ± 0.26	0.9703
Energy from fat(%)	15.37 ± 0.20	15.07 ± 0.27	0.3495
Fiber(g)	7.51 ± 0.12	8.17 ± 0.17	0.0012**
Calcium(mg)	520.55 ± 9.53	544.87 ± 13.09	0.1233
Phosphorus(mg)	1183.85 ± 14.68	1183.16 ± 20.16	0.9775
Iron(mg)	14.09 ± 0.21	14.38 ± 0.29	0.4120
Sodium(mg)	5429.99 ± 114.95	5564.01 ± 157.80	0.4813
Potassium(mg)	2770.39 ± 35.81	2867.16 ± 49.16	0.1027
Vitamin B_1(mg)	1.42 ± 0.02	1.46 ± 0.03	0.2663
Vitamin B_2(mg)	1.11 ± 0.02	1.07 ± 0.03	0.2578
Niacin(mg)	18.51 ± 0.36	17.68 ± 0.50	0.1654
Vitamin C(mg)	119.05 ± 2.46	130.83 ± 3.38	0.0039**

** : $p < 0.01$: *** : $p < 0.001$

Table 5-2. Mean per capita nutrient intake by alcohol consumption status(Female)

Nutrient	Alcohol consumption status		Significance(p)
	Non-drinker(n=1846)	Drinker(n=2010)	
Energy(kcal)	1745.28 ± 24.25	1744.53 ± 14.72	0.9784
Protein(g)	65.78 ± 1.64	64.99 ± 0.99	0.6744
Fat(g)	30.08 ± 0.85	29.82 ± 0.51	0.7886
Carbohydrates(g)	301.83 ± 4.27	307.92 ± 2.59	0.2108
Energy from carbohydrates(%)	70.51 ± 0.35	71.77 ± 0.21	0.0015**
Energy from protein(%)	14.83 ± 0.33	14.77 ± 0.20	0.8781
Energy from fat(%)	14.50 ± 0.27	14.39 ± 0.16	0.7158
Fiber(g)	6.65 ± 0.15	6.73 ± 0.09	0.6321
Calcium(mg)	440.55 ± 11.84	460.43 ± 7.18	0.1401
Phosphorus(mg)	933.75 ± 15.34	950.18 ± 9.31	0.3472
Iron(mg)	11.65 ± 0.27	11.67 ± 0.17	0.9690
Sodium(mg)	4281.51 ± 94.50	4303.69 ± 57.35	0.8367
Potassium(mg)	2378.77 ± 46.77	2381.38 ± 28.39	0.9610
Vitamin B_1(mg)	1.13 ± 0.02	1.14 ± 0.01	0.8406
Vitamin B_2(mg)	0.88 ± 0.02	0.88 ± 0.01	0.8264
Niacin(mg)	14.13 ± 0.31	13.80 ± 0.19	0.3382
Vitamin C(mg)	123.26 ± 3.86	126.00 ± 2.34	0.5340

** : $p < 0.01$

Conclusion

It has been observed that diet of Korean drinkers was poor in several aspects, including lower consumption of foods from vegetable origin. They also had significantly less consumption of carbohydrate than non-drinkers.

This result suggests the dietary vulnerability of Korean drinkers in terms of unbalanced intake of foods and nutrients. Therefore nationwide nutrition education for drinkers should focus on more consumption

of vegetable foods to provide more carbohydrate to attain the balance of macronutrients in calorie intake.

Those nationwide nutrition actions are required to prevent increasing risk of malnutrition and potential risk of degenerative diseases caused by the unbalanced diet of Korean drinkers.

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