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Nutritional Status Associated with Smoking and Other Factors in Korean Adults Women

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ABSTRACT

An increasing number of women are becoming victims of their smoking habits. Cigarette smoking is implicated as a major cause of several chronic diseases. This study was performed to investigate the nutritional status associated with smoking and other factors like drinking or fruit and vegetable consumption frequency in Korean adult women. The 2001 Korean National Health and Nutrition Survey provided the current adult women sample (n = 2900), who were categorized as smoking (n = 141) and nonsmoking group (n = 2759). The smoking women declared significantly lower intakes of carbohydrate, calcium and vitamin C and higher alcohol than nonsmokers, but with nonsignificant difference of BMI. The smoking and drinking group showed the lowest intakes in most of the nutrients, the lowest BMI and significantly elevated blood pressure. The smoking group with fruit and vegetable consumption frequency less than 3 times a day also showed lower intakes of most of the nutrients and significantly higher systolic blood pressure. Less proportion of smokers perceived their health status very good or good and more smokers felt depressed often. In conclusion it seems cigarette smoking is associated with the decreased nutrient intakes in adults women. When smoking is connected with other unhealthy dietary habits like drinking or lower fruit and vegetable consumption, it may exacerbate the nutritional status and cause elevated blood pressure. (*J Community Nutrition* 6(1) : 3~11, 2004)

KEY WORDS : women · smoking · drinking · fruit and vegetable consumption · nutritional status.

Introduction

Cigarette smoking is implicated as a major cause of several chronic disease including cardiovascular disease, pulmonary disease and cancer (Diana 1993). It is known that smokers differ from nonsmokers on a wide range of nutrient intakes (Herbert, Kabat 1989 ; Ma et al. 2000), alcohol consumption, physical activity and other lifestyle risk factors (Raitakari et al. 1995 ; Thomton et al. 1994).

It is estimated that more than 200 million women smoke worldwide (Seltzer 2003). An increasing number of women are becoming victims of their smoking habits. Tobacco advertising has linked smoking with women's achievement of equality with men. The marketing experts promote smoking as a way of remaining slim in a culture obsessed with thinness (Fielding JE). The odds of being a smoker were higher for adolescents who perceived themselves to be overweight and who had employed weight control behaviors in the last 12 months (Winter et al. 2002). In addition to lung cancer, smoking of women may be associated with increased risk of breast cancer, especially for smoking before a first full term baby (Terry, Rohan 2002). Smoking also appears to increase the risks of intraepithelial neoplasia of the cervix and postmenopausal osteoporotic fractures, particulary among nonobese women (Fielding 1987). Possibly the worst consequences of smoking by women are its effects on reproduction and on children. Depression and effect of smoking on the birth weight were confirmed (Fieldign 1987).

It was also reported that cigarette smoking changed lipoprotein profile, elevating serum cholesterol, TG and LDL-cholesterol and depressing HDL-cholesterol (Craig et al. 1989 ; Craig et al. 1990). The effect of smoking on serum cholesterol concentration suggested increased absolute risk of coronary artery disease (Craig et al. 1989). It was reported that smoker showed significantly decreased consumption of fruits and lower vitamin A and fiber scores compared to nonsmo-

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kers (Hevbert, Kabat 1989).

Dallongeville et al (1998) also observed higher intakes of energy, total fat, saturated fat, cholesterol and alcohol and lower intakes of polyunsaturated fat, fiber, vitamin C, vitamin E and β carotene of smokers than of nonsmokers. It seems the nutrient intakes of smokers differ substantially from those of nonsmokers. Some of these differences may exacerbate the deleterious effects of smoke components on cancer and coronary heart disease risk.

The connection between smoking and dietary intake is extremely complex. It was demonstrated that tobacco smoke exposure was associated with a marked reduction in monoamine oxidase (MAO), an enzyme related to mood dysregulation of appetite or attitude toward food (Grumberg 1986).

According to the Korean National Health and Nutrition Survey (Korean Health Industry Development Institute 2001 ; Ministry of Health and Welfare 2001), the smoking incidence of younger women was 5.4% in 2001, which was higher than that of 1998's. Smoking by younger women is regarded as more dangerous because of its effect on the reproduction and lower birth weight of a new-borne baby (Fielding 1987). In Korea, there are several studies carried out for high school female students (Kim et al. 1999) and college female students (Kim et al. 1997) in a small scale sample survey. For nationwide smoking and dietary intake data, there are no studies except Kim (2002) analyzed in 1998 KNHANS data to identify the differences in dietary pattern of adult Korean by smoking status.

Therefore there was not enough information to have general view of dietary pattern of adults women according to smoking status and in relation to other factors like drinking or fruit and vegetable consumption frequency. In this study we identified the differences in nutrient intakes, plasma lipid profile by smoking status or with other factors like alcohol drinking and fruit and vegetable consumption frequency.

Subjects and Methods

1. Data collection and processing

The data was derived from the 2001 Korean National Health and Nutrition Survey (KNHANS) conducted by the Ministry of Korean Health and Welfare (2001). The survey sample comprised of 37,769 persons (12,183 households) representing the Korean population. The 2001 KNHANS consisted of a four part survey including 1) health interview survey on disease prevalence and health care service utilization 2) health exami-nation survey on 6 major degenerative diseases 3) health behavior survey on smoking, drinking, exercise and sleeping and 4) nutrition and dietary survey (Kim 2002). Specially trained interviewers had conducted the health behavior survey on smoking, drinking and food consumption frequencies. For the dietary survey, 24 hour recall method was used. Trained dietitian interviewed subjects at their home. Food portions were converted into weight according to the standard estimators. Nutrient intake was estimated using the food composition table published by the National Rural Living Science Institute.

Adult women aged 20y $\leq$ <65 were of interest in current research. To minimize potential bias due to special dietary intakes, women in pregnancy, lactation or on a special diet were excluded. The resulting sample included 2877 adult women.

Smoking status was determined from the answers to the question : "Are you currently smoking?" The subjects who responded "yes" were categorized as the smoking group and "no" as the nonsmoking group. Drinking status was investigated from the answers to the question : "Are you currently drinking?" The subjects responded as currently drinking were categorized as the drinking group, and subjects not currently drinking were grouped as the nondrinking group.

The consumption frequencies of fruits and vegetables were counted with the results of the food frequency questionnaire. The kinds of foods used for counting consumption frequency of fruit were tangerine, persimmon (or dried persimmon), apple, pear, watermelon, melon, strawberry, grape, peach and banana. For consumption frequency of vegetables bean sprout, spinach, green pepper, carrot, green pumpkin, cabbage, tomato, mushroom, seaweed and dried laver were used (vegetables consumed as Kimchi were not counted).

The consumption frequency of each food was calculated based on the frequency per day : 1 point for once a day, 2 points for twice a day, 3 points for three times a day, 0.71 point for 4 − 6 times per week, 0.36 point for 2 − 3 times per week, 0.14 point for one time per week, 0.08 point for 1 time per month and 0 point for 6 − 11 times per year or rarely eaten. Then all the points for 10 fruits or 11 vegetables were summed for each person. The subjects were classified as fruit + vegetable >3 group when summed points was more than 3.

2. Statistical analysis

All values were expressed as group mean ± SD or frequency distribution N(%). Differences between the means of two-groups were examined using student t-test. ANOVA and Duncan's multiple range test were used to determine differences for 4 groups. All the analyses were done using SAS statistic software. Less than 5% error was considered as statistically significant.

Results and Discussion

1. Nutrient intakes related to smoking status

Table 1 shows the nutrient intakes of the subjects. The smoker women declared significantly lower intakes of carbohydrates, crude fiber, calcium and vitamin C and higher intakes of alcohol than nonsmokers. In a previous study (Kim 2002) there were no significant differences of nutrient intakes by smoking status for the females aged over 20, in contrast that the male smokers showed lower carbohydrate intake. No significant differences of nutrient intakes were observed in the study of female adolescent smokers (Kim et al. 1999). The lower intakes of fiber, vitamin C and higher intakes of alcohol of smoking women in this study were supported by the results in other studies (Dallongeville 1998 ; Herbert et al. 1990 ; Midgette et al. 1993) but not lower carbohydrates The higher fat and cholesterolintakes reported in another study (Dallingeville 1998) were not found in this study. Practice of dietary and health behavior of Koreans differ from that of other western countries in a way that they consume more carbohydrates, mainly in rice. It seems the reaction with smoking to the food choice is different from that of westerners.

The connection between smoking and dietary intake is extremely complex (Dallongeville 1998). It was reported that tobacco smoke exposure associated with marked reduction in MAO (Fowler et al. 1996) may result in dysregulation of appetite or attitude toward food (Grunberg 1986).

2. BMI, blood pressure and serum lipid profile related to smoking status

There was no significant difference of BMI by smoking status even though the smokers showed significantly lower carbohydrate intake and tendency of lower energy intake (Table 2). In most populations, smokers weigh less than do nonsmokers (Grunberg 1991 ; Molarius et al. 1997). However, in Finnish men, the relation between smoking and BMI was reported to change from an inverse association to a positive one (LahtiKoski et al. 2002).

Smokers showed slightly higher, but not significant differences in serum cholesterol and TG, but higher HDL-C in this study. Our results were not consistent with the previous reports that adults smokers had significantly higher serum concentrations of cholesterol, TG and LDL-C and lower serum concentrations of HDL-C (Carig et al. 1989). In wes-

Table 1. Nutrients intakes by smoking status in adult female

	Smoking		T-value
	Yes(n=141)	No(n=2759)	
Energy(kcal)	1758.9 ± 816.0[1)]	1887.5 ± 736.8	2.89
Protein(g)	68.0 ± 52.7	68.2 ± 37.6	0.11
Fat(g)	36.1 ± 31.5	37.3 ± 31.1	0.38
Carbohydrate(g)	269.5 ± 107.7	313.0 ± 117.9	15.34***[2)]
Fiber(g)	6.00 ± 4.3	7.4 ± 4.4	7.40**
Calcium(mg)	426.2 ± 341.7	482.3 ± 302.2	3.92*
Phophorus(mg)	1048.1 ± 611.0	1126.6 ± 500.4	3.64
Iron(mg)	11.5 ± 10.1	12.6 ± 9.8	2.60
Na(mg)	5236.2 ± 3874.2	5074.8 ± 3254.6	0.08
K(mg)	2757.0 ± 1995.1	2947.1 ± 1425.8	0.76
Vitamin A(R.E)	727.2 ± 968.6	638.2 ± 690.5	0.17
Vitamin B_1(mg)	1.12 ± 0.79	1.24 ± 0.59	1.39
Vitamin B_2(mg)	1.03 ± 0.73	1.07 ± 0.59	0.83
Niacin(mg)	17.65 ± 16.61	16.75 ± 10.26	1.30
Vitamin C(mg)	113.7 ± 91.9	156.1 ± 128.1	7.07**
Alcohol(g)	11.6 ± 41.0	2.5 ± 13.5	21.71***

1) Mean ± SD, 2) Significantly different with T test, *** : $p<0.001$, * : $p<0.01$, * : $p<0.05$

tern countries, a majority of the studies reported that smokers had higher intakes of energy, fat, cholesterol and alcohol intakes and higher serum cholesterol and LDL-C. The results in this study may reflect the different dietary pattern of Korean adult female smokers compared to the westerners in the fact that they did not show higher intakes of energy and fat but rather significantly lower carbohydrate and slightly lower energy intake.

3. Nutritional status related to smoking and drinking status

In this study it was found that smoking and drinking women had lower intakes in energy, fat, carbohydrates, fiber, iron, vitamin B group and vitamin C, but significantly higher alcohol consumption (Table 3). It seems that the tendency of lower intake of energy shown in smokers was largely due to the lowest intake of energy in smoking and drinking women. Expectedly women smoking and drinking together are at risk of malnutrition, especially for calcium and iron nutritional status.

It was observed that drinking had a strong association with being a smoker. The link between both high-risk behaviors, smoking and drinking results from common causes

Table 2. BMI, blood pressure and serum lipid profile by smoking status in adult female

	Smoking		T-value
	Yes (n = 123)	No (n = 2727)	
Weight (kg)	59.7 ± 10.5[1)]	57.8 ± 8.6	0.69
Height (cm)	159.1 ± 6.2	157.6 ± 5.7	1.48
BMI (Body Mass Index) (kg/m^2)	23.9 ± 4.2	23.4 ± 3.4	0.02
Systolic Blood pressure (mmHg)	123.7 ± 23.9	116.9 ± 17.3	1.79
Diastolic Blood pressure (mmHg)	77.4 ± 12.6	74.3 ± 11.3	1.32
SGOT	23.3 ± 11.0	20.4 ± 7.1	1.67
SGPT	19.3 ± 11.7	17.1 ± 9.7	0.73
Serum cholesterol (mg/dl)	193.0 ± 40.8	184.0 ± 40.5	1.00
HDL-cholesterol (mg/dl)	52.6 ± 13.1	48.9 ± 10.6	2.06[*2)]
Serum triglyceride (mg/dl)	138.5 ± 79.8	119.1 ± 70.2	1.44

1) Mean ± SD, 2) Significantly different with T test, * : $p < 0.05$

Table 3. Nutrients intakes by smoking and drinking status

	Group				F-value
	Smoking only (n = 57)	Smoking and drinking (n = 83)	Drinking only (n = 827)	Nonsmoking and nondrinking (n = 1910)	
Energy (kcal)	1915.0 ± 844.3[a1)]	1683.8 ± 727.3[b]	1924.0 ± 722.9[a3)]	1867.1 ± 713.2[a]	3.34[*2)]
Protein (g)	76.2 ± 65.3[a]	61.0 ± 35.7[b]	70.0 ± 37.3[ab]	67.6 ± 37.1[ab]	2.61[*]
Fat (g)	41.9 ± 42.0	35.9 ± 34.0	40.5 ± 31.1	35.0 ± 29.6	6.85[***]
Carbohydrate (g)	307.1 ± 104.2[a]	250.7 ± 111.8[b]	305.8 ± 112.7[a]	315.7 ± 116.0[a]	9.27[***]
Fiber (g)	7.43 ± 5.23[a]	5.54 ± 3.33[b]	7.13 ± 4.37[a]	7.42 ± 4.34[a]	5.47[***]
Calcium (mg)	468.1 ± 331.7	408.1 ± 329.8	478.4 ± 299.3	487.6 ± 305.1	1.92
Phosphorus (mg)	1165.3 ± 680.4[a]	965.1 ± 432.2[b]	1134.5 ± 494.8[a]	1126.4 ± 494.7[a]	3.09[*]
Iron (mg)	12.9 ± 11.2[a]	10.1 ± 6.1[b]	12.4 ± 9.0[ab]	12.7 ± 10.6[a]	1.91[*]
Na (mg)	5800.8 ± 3494.3[a]	4533.7 ± 2735.1[b]	5041.0 ± 3057.1[ab]	5165.5 ± 3354.7[ab]	2.01[*]
K (mg)	2974.0 ± 1360.8	2729.3 ± 2406.6	2939.8 ± 1330.8	2937.5 ± 1439.9	0.58
Vitamin A (R.E)	684.9 ± 833.0	565.5 ± 700.0	633.1 ± 616.2	640.5 ± 698.2	0.43
Vitamin B_1 (mg)	1.3 ± 0.93[a]	1.06 ± 0.72[b]	1.29 ± 0.85[a]	1.21 ± 0.68[ab]	3.54[*]
Vitamin B_2 (mg)	1.10 ± 0.81	0.97 ± 0.58	1.11 ± 0.59	1.05 ± 0.57	2.59
Niacin (mg)	19.63 ± 22.02[a]	16.56 ± 11.38[b]	17.85 ± 12.84[ab]	16.29 ± 8.86[b]	5.54[***]
Vitamin C (mg)	146.1 ± 104.8[a]	110.5 ± 97.6[b]	148.2 ± 119.7[a]	157.0 ± 132.4[a]	4.16[**]
Alcohol (g)	0.01 ± 0.05[b]	6.27 ± 21.62[a]	6.27 ± 21.62[a]	1.29 ± 10.11[b]	36.90[**]

1) mean ± SD, 2) significantly different with ANOVA. *** : $p < 0.001$, ** : $p < 0.01$, * : $p < 0.05$
3) Means with superscript not sharing the same letter are significantly with Duncan's multiple range test
*** : $p<0.01$, ** : $p<0.01$, * : $p<0.05$

rather than from drinking leading to smoking (Ritchey et al. 2001). Nakajima et al (1992) reported that as alcohol consumption increases, the amount of food, especially grain intake decreases. In another study conducted by Yoshita (1998), it was found that pure alcohol consumption more than 23 g per day, was related to decreased energy intake from food sources other than alcohol.

Santolaria et al (2000) reported that alcoholics were frequently malnourished with decreased BMI, lean and fat mass. Consumption of large quantities of alcoholic beverages leads to disturbances in the intestinal absorption of nutrients including vitamins, sodium and water, which contribute to the tendency in alcoholics to develop diarrhea (Bode, Bode 2003).

In this study the mean weight of each group was not significantly different, but smoking and drinking women were significantly taller, consequently showed the lowest BMI ($p<0.001$) (Table 4). Albanes et al (1987) reported smokers weighed less and gained weight with cessation of smoking. Smoking increased the rate of energy metabolism and can bring lower weight with similar energy intakes (Glauser et al. 1970).

Even though the smoking and drinking women showed significantly lower intakes in most of the nutrients and lower BMI, they were observed as having significantly elevated systolic blood pressure compared to the nonsmoking group. It is well known that smoking leads to constriction of blood vessels and consequently high blood pressure (Rosenberg et al. 1990).

For serum lipid profile, the smoking only group showed significantly higher serum cholesterol, TG and lower HDL-C. Therefore women smoking only seem to be at a higher risk of cardiovascular disease.

4. Nutritional status related to smoking and fruit and vegetable consumption frequency

It was reported that current smokers had decreased consumption of fruits, vitamin A and fiber scores compared to nonsmokers (Herbert et al. 1990). In this study the smoking group with fruit and vegetable consumption frequency less than 3 times/day (SGFV < 3) showed significantly decreased intakes of energy, protein, carbohydrates and fiber (Table 5). In addition to the major nutrients, calcium, potassium, vitamin A, vitamin C were also lower but the higher consumption of alcohol was observed in the SGFV < 3.

There were no significant differences for weight, height, BMI and serum lipid profile among groups by smoking and fruits and vegetable consumption frequency (Table 6). However the SGFV < 3 was observed as having significantly higher systolic pressure and SGOT. In contrast the SGFV > 3 showed similar blood pressure to the nonsmokers.

Thousands of biologically active phytochemicals have been identified in plant foods. Of the plant food groups, fruits and vegetables are the most botanically diverse. A diet rich in fruits and vegetables were reported to have protection against cardiovascular disease (Nesser, Powles 1997), several common cancers (Steinmetz, Potter 1996) and other chronic diseases. Ma et al (2000) reported current smokers had the lowest dietary antioxidant intake. Fatty foods contributed more to the antioxidant intakes of currents smokers, whereas fruits

Table 4. BMI, blood pressure and serum lipid profile by smoking and drinking stutus

	Group				F-value
	Smoking only (n = 57)	Smoking and drinking (n = 83)	Drinking only (n = 827)	Nonsmoking and nondrinking (n = 1910)	
Weight (kg)	58.1 ± 8.4[1)]	58.1 ± 9.7	57.5 ± 8.3	57.5 ± 8.4	0.18
Height (cm)	156.3 ± 5.9[c]	159.4 ± 4.7[a3)]	158.0 ± 5.4[ab]	157.1 ± 5.6[b]	9.19***[2)]
BMI (Body Mass Index) (kg/m^2)	23.8 ± 3.6[a]	22.9 ± 3.8[b]	23.0 ± 3.3[ab]	23.3 ± 3.4[ab]	2.38*
Systolic Blood pressure (mmHg)	119.9 ± 22.2[a]	119.7 ± 19.7[a]	114.1 ± 15.0[b]	117.1 ± 17.3[ab]	7.23***
Diastolic Blood pressure (mmHg)	75.2 ± 10.8[a]	75.4 ± 11.1[a]	72.8 ± 11.1[b]	74.3 ± 11.0[a]	3.93**
SGOT	23.1 ± 12.5[a]	20.4 ± 6.5[b]	19.8 ± 7.1[b]	20.2 ± 7.1[b]	3.64*
SGPT	17.7 ± 12.3	16.5 ± 8.3	16.2 ± 9.8	17.0 ± 9.3	2.10
Serum cholesterol (mg/dl)	190.4 ± 36.4[a]	182.9 ± 35.0[c]	177.9 ± 35.5[b]	184.4 ± 40.5[ab]	6.02***
HDL-cholesterol (mg/dl)	46.8 ± 11.4[c]	53.6 ± 10.8[a]	49.9 ± 10.7[b]	48.0 ± 10.1[bc]	11.84***
Serum triglyceride (mg/dl)	128.3 ± 66.5[b]	123.9 ± 72.3[ab]	110.9 ± 62.6[b]	118.9 ± 70.5[b]	3.28*

1) Mean ± SD,
2) Significantly different with ANOVA, *** : $p<0.001$, ** : $p<0.01$, * : $p<0.05$
3) Means with superscript not sharing the same letter are significantly different with Duncan's multiple range test, *** : $p<0.001$, ** : $p<0.01$, * : $p<0.05$

and vegetables contributed less. Cigarette smoke contains high amount of free radicals (Pryor, Stone 1993) which may be the most critical factors triggering plasma antioxidant depletion (Eiserich et al. 1995). The toxic products resulting from cigarette smoking are thought to activate inflammatory immune response, which may play an influential role in smoking-related chronic diseases (Halliwell et al. 1992). It seems smokers need more antioxidant intakes to compensate the toxic effect of smoking.

However it was reported that smokers consumed significantly less fruits and vegetables than nonsmokers. It appears that smokers have a less healthy diet in addition to smoking, placing them in a higher risk for chronic disease as a results of both dietary and smoking habits (Palaniappan et al. 2001).

Table 5. Nutrients intakes by smoking and fruit and vegetable consumption frequency

	Smoking and fruit and vegetable consumption				F-value
	Smoking and fruit + vegetable > 3 (n = 91)	Smoking and fruit + vegetable < 3 (n = 49)	Non smoking and fruit + vegetable > 3 (n = 2163)	Non smoking and fruit + vegetable < 3 (n = 572)	
Energy (kcal)	1826.0 ± 720.7$^{ab1)}$	1689.6 ± 887.2$^{b3)}$	1897.6 ± 717.0^{a}	1834.6 ± 713.8^{ab}	2.50*
Protein (g)	70.3 ± 50.7	61.3 ± 49.49	69.5 ± 38.0	63.9 ± 33.6	3.89$^{**2)}$
Fat (g)	38.6 ± 31.5	37.7 ± 46.9	36.8 ± 29.4	36.1 ± 33.0	0.21
Carbohydrate (g)	287.4 ± 107.0^{a}	248.2 ± 117.4^{b}	314.9 ± 115.5^{a}	304.4 ± 113.2^{a}	7.62***
Fiber (g)	6.7 ± 4.3^{ab}	5.6 ± 4.2^{b}	7.5 ± 4.4^{a}	6.9 ± 4.2^{a}	5.95***
Calcium (mg)	471.0 ± 325.7^{a}	361.1 ± 331.4^{b}	497.3 ± 310.6^{a}	437.3 ± 269.7^{ab}	8.60***
Phophorus (mg)	112.1 ± 561.9^{a}	908.9 ± 515.4^{b}	1145.3 ± 502.7^{a}	1066.6 ± 458.6^{a}	6.94***
Iron (mg)	11.63 ± 7.84	10.47 ± 9.89	12.78 ± 8.63	12.05 ± 14.55	1.79
Na (mg)	5339.0 ± 3070.0	4512.2 ± 3166.8	5199.0 ± 3334.5	4853.0 ± 2994.9	2.35
K (mg)	2894.8 ± 1320.4	2706.5 ± 2967.3	2993.6 ± 1453.2	2722.4 ± 1193.3	5.78***
Vitamin A (R.E)	694.3 ± 836.0^{a}	465.2 ± 557.9^{b}	642.2 ± 647.8^{ab}	624.4 ± 767.8^{ab}	1.37*
Vitamin B_1 (mg)	1.18 ± 0.72	1.12 ± 0.98	1.24 ± 0.75	1.19 ± 0.70	1.26
Vitamin B_2 (mg)	1.07 ± 0.64	0.93 ± 0.75	1.08 ± 0.58	1.02 ± 0.58	2.59
Niacin (mg)	17.70 ± 15.82^{a}	18.01 ± 18.00^{a}	17.07 ± 10.55^{a}	15.58 ± 8.94^{b}	3.40*
Vitamin C (mg)	132.1 ± 94.0^{ab}	111.8 ± 114.6^{b}	157.7 ± 129.2^{a}	141.9 ± 126.4^{ab}	4.93**
Alcohol (g)	6.0 ± 22.3^{b}	15.7 ± 49.5^{a}	2.6 ± 13.8^{b}	3.5 ± 17.8^{b}	11.49***

1) Mean ± SD, 2) Significantly different with ANOVA, *** : $p<0.001$, ** : $p<0.01$, * : $p<0.05$
3) Means with superscript not sharing the same letter are significantly different with Duncan's multiple range test
*** : $p<0.001$, ** : $p<0.01$, * : $p<0.05$

Table 6. BMI, blood pressure and serum lipid profile by smoking and fruits and vegetables consumption frequency

	Smoking, fruit and vegetable consumption				F-value
	Smoking and fruit + vegetable ≥ 3 (n = 91)	Smoking and fruit + vegetable < 3 (n = 49)	Non smoking and fruit + vegetable ≥ 3 (n = 2163)	Non smoking and Fruit + vegetable < 3 (n = 572)	
Weight (kg)	58.1 ± 8.3$^{1)}$	57.6 ± 10.9	57.7 ± 8.4	57.0 ± 8.3	0.99
Height (cm)	157.7 ± 5.3	157.5 ± 5.7	157.5 ± 5.6	157.0 ± 5.4	0.87
BMI (Body Mass Index) (kg/m^2)	23.4 ± 3.5	23.2 ± 4.3	23.3 ± 3.3	23.2 ± 3.3	0.31
Systolic Blood pressure (mmHg)	118.5 ± 20.4$^{ab3)}$	122.4 ± 16.1^{a}	116.0 ± 16.2^{b}	117.1 ± 17.9^{ab}	2.32*
Diastolic Blood pressure (mmHg)	75.1 ± 10.6	76.0 ± 9.3	73.8 ± 10.9	74.5 ± 10.1	1.10
SGOT	2.0 ± 9.4^{b}	23.5 ± 10.8^{a}	20.4 ± 7.3^{b}	2.0 ± 6.7^{b}	2.86$^{*2)}$
SGPT	16.9 ± 8.4	19.2 ± 10.0	17.0 ± 9.7	17.0 ± 9.4	0.60
Serum cholesterol (mg/dl)	182.7 ± 34.0	193.0 ± 40.1	182.4 ± 38.4	181.5 ± 140.9	0.98
HDL-cholesterol (mg/dl)	48.8 ± 11.8	50.1 ± 9.9	48.4 ± 10.3	48.1 ± 10.0	0.55
Serum triglyceride (mg/dl)	125.8 ± 65.6	134.9 ± 82.8	116.1 ± 67.5	116.2 ± 66.6	1.66

Mean ± SD, Significantly different with ANOVA, *** : $p<0.001$, ** : $p<0.01$, * : $p<0.05$
3) Means with superscript not sharing the same letter are significantly different with Duncan's multiple range test,
*** : $p<0.001$, ** : $p<0.01$, * : $p<0.05$

Supporting this, the SGFV < 3 in this study showed significantly higher systolic blood pressure than the SGFV > 3. It seems future interventions should target the clustering of cigarette smoking and other unhealthy life style habits (Ma et al. 2000) including an imprudent diet. Smokers should be encouraged to consume more fruits and vegetables to compensate the toxic effect of smoking.

5. Life style factors related to smoking

Less proportion of smokers (33.2%) perceived their health status as very good or good compared to nonsmokers (43.0%) (Table 7). More smokers reported they are concerned about their health and always or often felt depressed. Neverthless the proportion of the smokers practicing health care was lower. It was reported that the rate of subjects with a depressive disorder among female never nicotine dependents was 13.7% and among female current nicotine dependents 31.6% (Meyer et al. 2004). Supporting this Lenz (2004) reported that students with a lifetime diagnosis of depression or treatment of depression were 7 times significantly associated with tobacco use.

Significantly more smoking people were observed with drinking frequency of 3 − 4 times or more per week and overdrinking. Ritchey et al (2001) have shown that the strong correlation between smoking and drinking resulted from

Table 7. Life style factors by smoking status in adult female

	Smoking		χ^2-value
	Yes	No	
Perceived health status			
Good or very good	60(33.2)[1]	1473(43.0)	6.87**[2]
Concern about health			
Occasionally or always concerned	153(84.5)	2614(76.4)	6.36*
Feeling sadness or depression last year			
Always or often feel,	149(82.3)	2384(69.9)	12.85***
Feel stress			
Much or very much	100(55.25)	1140(33.30)	36.28***
Practicing health care			
Practicing (exercise or walking, diet, sufficient rest, sleeping or use of health food etc.)	88(48.6)	1933(56.6)	4.41*
Drinking			
Frequently drinking,	110(60.8)	1046(30.5)	72.20***
Usual drinking frequency			
More than 3−4 times for a week or almost everyday	34(28.1)	89(8.3)	46.31***
Usual drinking consumption for one accasion			
More than 1 - 2 bottles of Soju (beer 4 - 8 bottles, liquors 6 - 12 glasses)	42(35.3)	111(10.3)	60.26***
Usual overdrinking frequency			
More than one time per a week	8(6.8)	12(1.1)	20.66***
Tried abstinence from drinking			
Yes	28(25.69)	153(14.99)	8.39**
Perceived weight			
A little obese or pretty obese	60(33.15)	1227(35.87)	0.55
Weight control			
Try to lose weight	62(34.44)	1169(34.15)	0.01
Weight control by exercise			
Yes	29(46.77)	617(53.37)	1.03
Weight control by diet			
Yes	47(75.81)	817(70.80)	0.72
Doing exercise			
Yes	44(24.31)	878(25.64)	0.16

1) N(%), 2) Significantly different with Chi-square test
*** : p<0.001, ** : p<0.01, * : p<0.05

shared causes, rather than from the effects of one type of drug use on the other.

It was reported that current daily smoking was strongly associated with a history of intentional weight loss episode in young adults (Winter et al. 2002). However in this report there was no relationship between dietary behaviors like weight control or exercise and smoking status.

Summary and Conclusion

This study was conducted to investigate the nutritional status associated with smoking status and other related factors (drinking status and fruit and vegetable consumption frequency in Korean adult women.

The data was derived from the 2001 Korean National Health and Nutrition Survey. Adults women aged 20Y ≤ <65 were of interest in current research.

The smoking women declared significantly lower intakes of carbohydrates, calcium and vitamin C and higher intakes of alcohol than nonsmokers. There was no significant difference of BMI by smoking status even though the smokers showed lower carbohydrate intake and tendency of lower energy intake.

Women smoking and drinking together showed the lowest intakes in energy, fat, carbohydrates, fiber, iron, vitamin B group and vitamin C and lower BMI but it was associated with significantly elevated blood pressure. The smoking group with fruit and vegetable consumption frequency less than 3 times a day also showed lower intakes in most of the nutrients but significantly higher systolic blood pressure. Less smokers (33.2%) perceived their health status as very good or good compared to nonsmokers (43.0%). More smokers reported that they are concerned about their health and often felt depressed. Significantly more smoking people were observed with drinking frequency of 3 − 4 times or more per week and overdrinking.

It seems cigarette smoking is associated with decreased nutrient intakes in adult women. When smoking is connected with other unhealthy dietary habits like drinking alcohol or lower fruit and vegetable intakes, it may exacerbate the nutritional staus and cause elevating blood pressure.

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