☐ Original Article ☐

Dietary Intake Differences among Korean Male Smokers, Ex-smokers and Non-smokers

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ABSTRACT

This study investigated the differences in dietary intake, age, body mass index(BMI), marital status and education of 1,585 Korean healthy males among current smokers, ex-smokers and non-smokers. Dietary intake was determined by a food frequency questionnaire at the Samsung Medical Center in Seoul, Korea. A bioelectric impedance analyzer measured height, body weight and BMI. This study identified 50% of the study group as current smokers and 30% as ex-smokers and 20% as non-smokers. The mean body mass index was $23.7kg/m^2$ and did not differ significantly among the three groups. The current smokers were younger(44.9 years old) and contained a lower percentage(58.5%) of college graduate than that of ex-smokers or non-smokers. The percentage of non-consumers of meat, eggs, beans and bean products was higher in non-smokers than that of ex-smokers or current smokers. Smoking was to a significant degree positively related to the amount of coffee and alcoholic beverages consumed and negatively related to the amount of milk and milk products and fruits consumed. The intake of eggs, milk and milk products, fruit, coffee, sweets, fats and oils were significantly different among the three groups, after adjusting for age, education level, marital status, and alcohol consumption. There was a strong positive relationship between smoking intensity and the intake of coffee and alcoholic beverages($p < 0.0005$), and an inverse relationship between smoking intensity and fruit, milk and milk product intake($p < 0.005$). The current smokers were characterized by a higher intake of total energy and cholesterol, and a lower intake of dietary fibers, β-carotine and folate than those of non-smokers or ex-smokers. The nutrient intake of ex-smokers was moderate and highest in β-carotine and folate, which suggested that ex-smokers were trying to change their life style. (*Korean J Community Nutrition* 1(2) : 125~132, 1999)

KEY WORDS : dietary intake · Korean male · smokers · alcohol · coffee.

Introduction

There have been several studies conducted regarding the dietary intake among smokers and non-smokers (Magetts et al. 1993 ; Mcphillips et al. 1994 ; Midgette et al. 1993 ; Nuttens et al. 1992 ; Subar et al. 1990) or ex-smokers, and such studies have shown differences in dietary intake between smokers and non-smokers. The assessment of nutritional habits in population studies has demonstrated that smokers and non-smokers differ in the way they select their food(Dollongeville et al. 1998 ; Subar et al. 1993). As of recently, smokers tend to have a lower dietary intake of fiber, carotene, thiamin, vitamin

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E and iron(Thomson et al. 1992), and there appears to exist an inverse association between smoking and the intake of vitamin C(Schectman et al. 1989) in both genders, and vitamin A and folate among women(Mcphillips et al. 1994).

Smokers have a lower dietary intake of a number of antioxidants, and a high free radical load due to smoking (Halliwell 1993). It has been suggested that the imbalance between the free radical load and antioxidant intake results in a greater possibility for oxidative damage to tissue(Halliwell 1993), and it has also been suggested that imbalances between antioxidants and free radicals may be important in the etiology of cancer(Carroll et al. 1991). The diet of ex-smokers show an increased ratio of polyunsaturated to saturated fatty acids and a decreased intake of saturated fatty acids(Midgette et al. 1993) which may help to reduce their risk of coronary heart disease (CHD). Smoking cigarettes may be related to dietary habits, which may contribute to the increased risk of CHD

(Hebert et al. 1990 ; Klesges et al. 1990 ; Larkin et al. 1990 ; Magetts et al. 1993 ; Midgette et al. 1993), stroke, and emphysema as well as cancer of the lungs, larynx, oral cavity, esophagus and stomach, kidney, bladder, pancreas and cervix(Subar et al. 1990). Smoking, food and alcohol consumption, as well as other lifestyle characteristics, which include daily activities and education levels, are associated with cancer risks(Subar et al. 1990). Food intake habits of smokers and non-smokers showed distinct differences. It has been suggested that non-smokers consume more fruits and milk and milk products and less coffee than smokers(brasche et al. 1998), and smokers consum fewer serving of fruits and vegetables than non-smokers in women(Mcphillips et al. 1994). Smokers consume more alcohol and coffee, have more sexual partners, have less exercise and sleep, consume less vitamins and mineral supplements and skipp breakfast more often than non-smokers(Blair et al. 1985 ; Block et al. 1988 ; Bradstock et al. 1987 ; Faulkner et al. 1987 ; Isvan et al. 1984 ; Jacobsen et al. 1987 ; Kannas L. 1981 ; Schoenborn et al. 1985). Possibly such dietary differences may have some health effects. It has been well documented that smoking is the high risk factor of lung cancer and CVD and those who smoke cigarettes eat less fruit and vegetables. Less intake of fruit and vegetables provide less antioxident vitamins which react on free radicals to protect the body from diseases. In this respect it is important to discover the influence of smoking on food intake and antioxident vitamins of middle and upper class Korean males. The purpose of this study was to examine the differences of food and nutrient intake of Korean men among current smokers, ex-smokers and non-smokers, taking into account age, BMI, marital status, education and alcohol intake.

Subjects and Methods

1. Subjects

This study consisted of 1,585 Korean healthy males, ages 18 through 79 years old, who took a physical examination at the Center for Health Promotion of the Samsung Medical Center, Seoul, Korea during a period of three months in 1998. Out of the 1,898 men examined, 1,585 men were included in the analysis, since 313 men had incomplete data for the analysis.

2. Data collection

Data of medical histories and demographic characteristics were collected. Age, marital status, education, smoking, and alcohol drinking were recorded from the standardized questionnaires. Smoking status was categorized as people who never smoked(non-smokers), current smokers, or ex-smokers. Height and body weight and Body Mass Index (BMI) were measured by a bioelectric impedance analyzer(TBF-202 TANIT, Japan) which is programed to calculate BMI after measuring height and body weight and other body composition. Dietary intake was determined by a quantitative food frequency questionnaire from each subject. The food frequency questionnaire was developed (Rim et al. 1998) based on a Korean nutrient data base system from the Korean Food Composition Table and the Recommended Dietary Allowances(RDA) for Koreans, 6th revision of 1995 as a standard reference. Nutrients were analyzed by a computerized dietary analysis system(Rim et al. 1998). Vitamin A, β-carotene, vitamin E, and vitamin C, dietary fiber, cholesterol, total energy, macronutrients, percent energy intake of protein, carbohydrate, fat, polyunsaturated fatty acid(PUFA), monounsaturated fatty acid (MUFA), saturated fatty acid, and alcohol were examined for the study. From five food groups, 16 food categories were selected for analysis, including Kimchi and steamed rice.

3. Statistical method

Analysis of variance and a Chi-square test were used to select characteristics related to smoking status. Multiple logistic regression, adjusting for related characteristics, was used to test if percentages of non-consumers of each food group were different among smoking categories. Analysis of variance, followed by a multiple comparison using the least significance difference method, was used to see the difference in nutrient intake among smoking categories. Analysis of covariance, adjusted for related characteristics, was used to examine the association of the amount of food intake and smoking status, and Bonferroni's method was used for pairwise comparisons. Multiple linear regression analysis, adjusted for related characteristics, was also used to investigate the trend between the amount of food intake and cigarette consumption per day. Ex-smokers were not included in this trend analysis. Because food amounts and nutrient intake figures were skewed, they were log-transformed.

Results

1. Characteristics of current smokers, ex-smokers and non-smokers

Selected characteristics of subjects are presented in Table 1. Twenty percent(n=324) of men had never smoked, whereas 50%(n=786) and 30%(n=475) of men were current smokers and ex-smokers, respectively. The mean age

of subjects was 47 years, and the mean body mass index was 23.7kg/m². Marital status showed that 93% of the men in the study were married. Additionally, sixty two percent of the subjects were college graduates. Age, marital status, and education levels were significantly different among current smokers, ex-smokers and non-smokers. BMI among the three smoking status groups were not significantly different. Current smokers were younger in age(44. 9 years) and contained a lower percent(58.5%) of college

Table 1. Selected characteristics of 1585 subjects by smoking status

Factors		Current smokers (n=786)	Ex-smokers (n=475)	Non-smokers (n=324)	Total (n=1585)	P-value
Age in year		44.9±10.4[1]	50.8±10.0	46.7±11.2	47.0±10.8	0.0001[2]
Body Mass Index	kg/m²	23.6±2.8	23.9±2.5	23.7±2.8	23.7±2.7	0.1484[2]
Marital status						
Single	%	5.2	2.3	9.9	5.3	
Married	%	93.1	95.4	87.4	92.6	0.0010[3]
Others	%	1.7	2.3	2.8	2.1	
Education						
Less than high school	%	12.9	8.6	13.6	11.7	
High school graduate	%	28.6	23.8	25.9	26.6	0.0150[3]
College graduate	%	58.5	67.6	60.5	61.6	

1) Mean±SD   2) P-value of analysis of variance   3) P-value of chi-square test

Table 2. Percentage of non-consumers(PN)[†] of 16 food groups by smoking status

Food	Current smokers (n=786)	Ex-smokers (n=475)	Non-smokers (n=324)	Total (n=1585)
	PN %	PN %	PN %	PN %
Grain and grain products				
Steamed rice	0.0	0.0	0.0	0.0
Grain products	0.0	0.2	0.0	0.1
Meat :				
Beef	0.0	0.0	0.0	0.0
Pork	3.4	5.9	6.8	4.9
Poultry	10.4	11.6	11.1	10.9
Fish	0.0	0.0	0.3	0.1
Eggs	9.7	11.6	13.0	10.9
Beans, bean products	0.1	0.2	0.3	0.2
Milk, milk products	7.3	5.5	4.3	6.1
Fruits	0.0	0.0	0.0	0.0
Vegetables				
Kimchi	0.0	0.0	0.0	0.0
Yellow, green vegetables	0.0	0.0	0.0	0.0
Other vegetables	1.5	1.3	2.8	1.7
Fats, oils and sweets	0.0	0.0	0.0	0.0
Coffee[1]	9.6[b,c]	19.0[a,b]	26.9[a,c]	15.9
Alcohol beverages[2]	9.0[b,c]	14.3[a,b]	15.4[a,c]	11.9

[†]Percentage of non-consumers(PN) : Percent of people who did not eat the food items
1) Significantly different among smoking categories, adjusting for age, education level, marital status, drinking level : p<0.05
2) Significantly different among smoking categories, adjusting for age, education level, marital status : p<0.05
a : Significantly different from current smokers : p<0.05 by the Bonferroni's method
b : Significantly different form non-smokers : p<0.05 by the Bonferroni's method
c : Significantly different from ex-smokers : p<0.05 by the Bonferroni's method

graduates than that of ex-smokers or non-smokers.

2. Percentage of non-consumers of 16 foods by smoking status

A certain number of the males did not eat some food items. Those are expressed as a percentage of non-consumers of food by the relevant smoking category. Analysis was performed on what percent of subjects had not eaten those food items. The distribution of non-consumers of food categories by current smokers, ex-smokers and non-smokers are presented in Table 2. Non-consumers of certain foods and their smoking status are presented in percent form. The percentage of non-consumers of six food items(steamed rice, other grain products, beef, fruits, Kimchi, and fat, oil and sweets) was 0.0%, for all the groups. This means that all subjects ate steamed rice, beef, fruit, and fat, oil and sweets regardless of smoking status. Some of the subjects ate other grain products, fish, beans and bean products, and vegetables, regardless of smoking status. The percentage of non-consumers of pork, poultry, eggs, beans and beans products, was high-

er in non-smokers than in ex-smokers or current smokers. Especially, the percentage of non-consumers of coffee and alcoholic beverages was significantly higher in non-smokers(coffee 26.9% ; alcoholic beverages 15.4%) than in ex-smokers(coffee 19.0% ; alcoholic beverages 14.3%) and current smokers(coffee 9.6% ; alcoholic beverages 9.0%). The percentage of non-consumers of milk and milk products was higher in current smokers than those in non-smokers. Smoking status was significantly related to abstinence from coffee and alcoholic beverages(p < 0.05).

3. Difference in average food consumption among current smokers, ex-smokers and non-smokers

The average intake of food among consumers for each type of food by smoking status, and results of multiple comparisons of food intake among smoking status are presented in Table 3. In Table 3, egg intake of non-smokers(14.7±2.1g) was significantly lower than that of current smokers(17.7±2.3g) and ex-smokers(16.1±2.3g). Smoking was negatively correlated to the amount of milk and milk products and fruit consumption, and positively

Table 3. Average intake among consumers by smoking status

Food		Current smokers (n=786)	Ex-smokers (n=475)	Non-smokers (n=324)	Total (n=1585)
Grain and grain products					
Steamed rice	g	546.5±191.8[1]	515.4±202.0	525.7±198.1	532.9±196.6
Grain products	g	126.7±88.6	121.2±87.1	116.5±81.8	123.0±86.8
Meat ;					
Beef	g	44.4±35.7	45.4±35.8	43.8±35.6	44.6±35.7
Pork	g	30.0±28.4	25.6±26.9	26.8±26.1	28.1±27.6
Poultry	g	11.7±11.0	10.8±10.6	10.9±10.4	11.3±10.7
Fish	g	51.3±38.9	54.9±44.4	49.2±38.4	51.9±40.6
Eggs[2]	g	17.7±20.6[b]	16.1±16.8[b]	14.7±18.6[a,c]	16.6±19.2
Beans, bean products	g	90.2±67.9	96.4±71.7	95.0±76.5	93.0±70.9
Milk, milk products[2]	g	130.2±139.2[b,c]	157.2±151.0[a]	160.0±160.1[a]	144.5±147.9
Fruits[2]	g	192.5±187.0[b,c]	231.1±210.8[a]	241.5±235.9[a]	214.1±206.0
Vegetables					
Kimchi	g	146.3±100.0	142.5±102.4	142.6±109.6	144.4±102.7
Yellow & green vegetables	g	180.5±136.5	191.8±135.5	180.8±146.6	183.9±138.4
Other vegetables	g	14.8±16.3	16.4±17.9	17.2±18.3	15.8±17.2
Fats, oils and sweets[2]	g	31.5±27.9[b]	27.4±24.0	23.8±21.3[a]	28.7±25.7
Coffee[2]	ml	277.1±218.0[b,c]	194.4±168.9[a]	157.0±155.1[a]	231.9±200.8
Alcohol beverage[3]	ml	248.3±282.4[b,c]	207.9±273.1[a]	171.8±252.7[a]	221.5±275.6

1) Mean±SD
2) Significantly different among smoking categories, adjusting for age, education level, marital status, drinking level ; p < 0.05
3) Significantly different among smoking categories, adjusting for age, education level, marital status ; p < 0.05
a : Significantly different from current smokers ; p < 0.05 by the Bonferroni's method
b : Significantly different from non-smokers ; p < 0.05 by the Bonferroni's method
c : Significantly different from ex-smokers ; p < 0.05 by the Bonferroni's method

correlated to the amount of coffee and alcoholic beverage intake among consumers. Food consumption of ex-smokers was similar to that of non-smokers. The consumption of alcoholic beverages in both ex-smokers(207.9±4.7ml) and non-smokers(172±4.7ml) was significantly lower than that of current smokers(248.9±4.9ml)(p<0.05). The amount of fat, oil and sweets consumption of current smokers(31.5±4.9g) was significantly higher than that of non-smokers(23.8±2.8g)(p<0.05). The amount of eggs, milk and milk products, fruits, coffee and fats, oils and sweets consumed were significantly different among smoking categories, after adjusting(geometric means adjusted) for age, education level, marital status, and alcohol consumption. The consumption of alcoholic beverages was significantly different among smoking categories, aft-

er adjusting(geometric means adjusted) for age, education level and marital status.

Multiple regression analysis resulted in a strong positive relationship between smoking intensity and the consumption of coffee(b=0.0266 ; p=0.0001) or alcoholic beverages(b=0.0106 ; p=0.0004) ; however, there was an inverse relationship between smoking intensity and the consumption of fruits(b=-0.0067 ; p=0.0007), milk and milk products(b=-0.0119 ; p=0.0001). Fig. 1 and Fig. 2 show the log-intake of food items, calculated by multiple regression equation, by smoking intensity for subjects who were college graduates(married) and whose average age was 47year old.
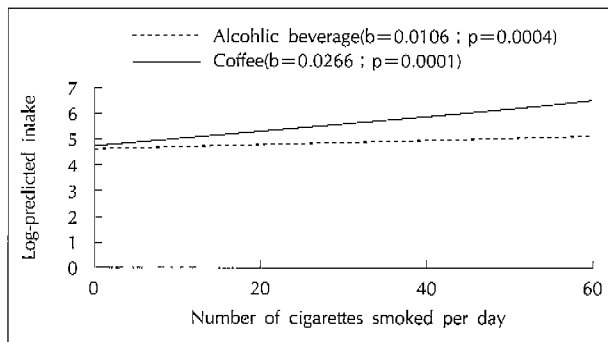

Fig. 1. Log-predicted intake of alcoholic beverage and coffee by cigarettes smoked per day. b : regression coefficient. p : p-value.
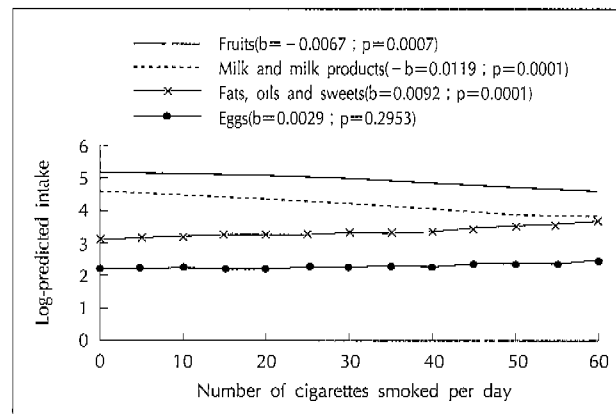

Fig. 2. Log-predicted intake of four food items by cigarettes smoked per day. b : regression coefficient. p : p-value.

Table 4. Nutrients intake of current smokers, ex-smokers and non-smokers

Nutrient		Current smokers (n=786)	Ex-smokers (n=475)	Non-smokers (n=324)	Total (n=1585)
Total energy	kcal	2442.8±729.3[1],b	2366.9±701.6b	2251.2±681.4a,c	2380.9±714.8
Protein	%[2]	14.7±2.4b,c	15.5±2.6a	15.4±2.5a	15.1±2.5
Fat	%[2]	18.5±4.7	18.7±4.7	18.8±4.8	18.6±4.7
Carbohydrate	%[2]	58.3±8.7b,c	59.2±8.5a	60.6±7.4a	59.0±8.4
Alcohol	%[2]	8.6±8.9b,c	6.6±8.5a	5.3±6.3c	8.6±8.9a
Dietary fiber	g	6.9±4.7b,c	8.0±4.9a	7.9±5.6a	7.4±5.0
Vitamin A	μg RE	822.9±512.0	877.3±525.9	830.0±533.6	840.7±520.9
Vitamin C	mg	150.0±82.0	155.4±78.0	155.8±93.8	152.8±83.4
Vitamin E	mg α-TE	7.0±3.4	7.4±3.7	7.2±3.6	7.2±3.5
β-Carotene	μg	3406.8±2469.2c	3771.1±2617.2a	3617.5±2642.0	3559.1±2553.5
Folate	μg	215.9±104.9	223.1±101.0b	216.2±124.4c	218.1±108.0
Total fatty acid(FA)	g	27.6±13.0	27.2±12.6	26.5±12.3	27.3±12.8
Saturated FA	g	7.6±4.5	7.6±4.5	7.5±4.3	7.6±4.5
Monounsaturated FA	g	10.9±5.4	10.5±5.2	10.2±5.1	10.6±5.3
Polyunsaturated FA	g	7.1±3.5	7.1±3.4	6.8±3.3	7.0±3.4
Cholesterol	mg	262.7±144.9b	261.6±131.0b	241.9±136.8a,c	258.1±139.3

1) Mean±SD   2) Percent engery intake from total energy
a : Significantly different from current smokers ; p<0.05 by the least significance difference method
b : Significantly different from non-smokers ; p<0.05 by the least significance difference method
c : Significantly different from ex-smokers ; p<0.05 by the least significance difference method

4. Difference in average nutrient intakes among current smokers, ex-smokers and non-smokers

The nutrient intake of current smokers, ex-smokers and nonsmokers is presented in Table 4. Total energy intake of non-smokers was significantly lower(2251.2 ± 681.4kcal) than that of current smokers(2442.8 ± 729.3kcal) and ex-smokers(2366.9 ± 701.6kcal). However, the percent energy intake of protein and carbohydrates of current smokers were significantly lower than that of ex-smokers and non-smokers. The percent energy intake of alcohol consumption of current smokers was higher($8.57\pm8.94\%$) than that of ex-smokers($6.60\pm8.52\%$) and non-smokers($5.33\pm6.33\%$). Intake of antioxidant vitamins, including mean vitamin A($840.7\pm520.9\mu g$), vitamin C (152.8 ± 83.4mg) and vitamin E(7.2 ± 3.5mg α-TE) were lower in current smokers than ex-smokers and non-smokers but not significantly lower. However, β-carotene intake of ex-smokers($3771.1\pm2617.2\mu g$) was significantly higher than that of current smokers($3406.8\pm2469.5\mu g$). Additionally, the intake of folate of ex-smoker($223.1\pm101.0\mu g$) was the highest among the three groups, and the folate intake of ex-smokers was significantly higher than that of non-smokers. With regard to the intake of fatty acids, there was no difference among the three groups. Cholesterol intake of non-smokers(241.9 ± 136.8mg) was significantly lower than that of ex-smokers or current smokers. The nutrient intake of ex-smokers was of a moderate amount, but β-carotene, folate and dietary fiber intake were highest among the three groups. This may be an indication that how ex-smokers are trying to change their life style.

Discussion

Ex-smokers had an average age of 51 years, which was the oldest among the three groups, and ex-smokers had more college graduates than the other two groups, while in the current smokers group, they were on average younger(44 years of age) than ex-smokers or non-smokers and 50%(758 people) of the subjects were current smokers. There was no difference in the BMI among the three groups in this study. This partially agreed with other studies(Midgette et al. 1993), which indicated that current smokers were younger and had lower BMI(Fehily et al. 1984 ; Midgette et al. 1993) than former or never smoking groups. The findings of this study suggest that there are dietary differences among current smokers, ex-smokers, and non-smokers. The finding of this study is that current smokers consumed less fruit, less milk and milk products, which appears to be supported by other studies(Subar et al. 1990). However, previous investigations of the relation of smoking to diet have also found that smokers consume higher quantities of fat, oil and sweet foods, coffee and alcoholic beverages than those of non-smokers(Isvan et al. 1984 ; Schoenborn et al. 1985) which is similar to our study. In a previous study(Larkin et al. 1990), smokers were found to have consumed more eggs than ex-smokers and non-smokers and this finding is supported by our study. This study also agreed with others(Midgette et al. 1993 ; Subar et al. 1990), which indicated that smokers and non-smokers differ in the way they select their foods. Because of smoking, it may affect a smoker's their food choice or preference of food and life style. Also we observed the same patterns in the dose-response relationship analysis. We compared our findings with results of other investigators(Morabia et al., 1990), which was a hospital-based data study conducted in the US. Morabia et al.s' study showed similar findings for fruit, coffee, alcohol intake, but showed differences for meat intake and vegetable intake from ours. In our study, there was no association between smoking and the intake of meat, beans, and vegetables, while US data showed there was no association of milk intake and smoking(Morabia et al. 1990). With respect to the consumption of steamed rice and Kimchi(a Korean pepper spicy pickled vegetable), which are Korean staple food, current smokers had a higher intake than those of ex-smokers or non-smokers, but there were no significant differences among smoking status in this study. With regard to nutrient intake, our study showed that current smokers consumed more total energy(but less percent energy intake of protein, less percent energy intake of carbohydrates from total energy, less dietary fiber, less β-carotene, and less folate) and more alcohol and cholesterol than ex-smokers and non-smokers which are supported by other investigators(Dollongeville et al. 1998 ; Fehily et al. 1984 ; Larkin et al. 1990 ; Mcphillips et al. 1994 ; Midgette et al. 1993 ; Subar et al. 1990 ; Thomson et al. 1992).

In this study, due to the lower consumption of fruits and vegetables of current smokers this resulted in a lower intake of vitamin A, vitamin C and vitamin E than

with regard to ex-smokers and non-smokers, but not significantly lower, which is also supported by other investigators(Carroll et al. 1991 ; Dollongeville et al. 1998 ; Halliwell B. 1993 ; Larkin et al. 1990 ; Schectman et al. 1989). Kim et al. study(Kim et. al 1998) reported that there were no difference in the intake of antioxidant vitamins, including vitamin A and vitamin C between current smokers and non-smokers. There was also no difference in fat intake among the three groups ; also there was no difference with regard to the intake of saturated, polyunsaturated and monounsaturated fatty acids among the three groups of this study which is different from others studies(Dallongeville et al. 1998 ; Midgette et al.1993). A limitation of this study is that our data is not nationwide population-based. Because of this, there were some differences in the distribution of marital status, and education level between our data and the National Census data(National Statistical Office 1997). In fact, the majority(93%) of the subjects in this study were married, but only 61% of the subjects of the National Census data (National Statistical Office 1997) were reported as married. Over 60 percent of our subjects had completed a 4 year-college, whereas only 14% of the subjects of the National Census data(National Statistical Office 1997) had graduated a 4 year-college(this difference in education level may be attributable to the fact that the subjects who came to the Samsung Medical Center generally belonged to the middle to upper socioeconomic classes in Korea). A higher education level could have possibly resulted in a lower proportion of current smokers. It appeared that the subjects who had a lower level of education tended to smoke more than men who had received a higher education. The percentage of current smokers in our data(50%) was lower than in the National Health Interview Survey data(68%)(Chong et al. 1995).

Non-smokers had a significantly lower total energy intake, cholesterol intake, but a higher intake of carbohydrates than current smokers and ex-smokers. The nutrient intake of ex-smokers was moderate in amount and highest in β-carotene and folate and dietary fiber, which appear to confirm that they were trying to change their life style. Based on our findings, it appears that current smokers are tending toward unhealthy patterns of food consumption. Therefore, current smokers need to increase their intake of fruits and vegetables and beans, and should consume less coffee and alcohol. In this regard, smokers should consume more antioxidant vitamins and dietary fibers to prevent coronary heart disease and cancer.

Conclusion

The food intake of current smokers was characterized by a lower intake of milk and milk products and fruit and a higher intake of alcohol beverage, coffee than non-smokers or ex-smokers. The nutrient intake of current smokers was characterized by a lower intake of the percent energy of protein and carbohydrates, dietary fibers and antioxidant vitamins, and a higher intake of total energy and cholesterol than non-smokers or ex-smokers. Such a nutrient profile may exacerbate the risk of coronary heart diseases and cancer. One can suggest that smokers should increase their intake of fruits, vegetables and beans, and should consume less coffee, alcohol and fewer oils and sweet foods.

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