

Dietary Habits of Smokers and Non-smokers in the Korean Health and Nutrition Survey

Young Ok Kim

Department of Food and Nutrition, Dongduk Women's University, Seoul 136-714, Korea

Abstract

Differences in dietary habits between Korean smokers and non-smokers were investigated using information obtained from 7,370 adults, aged 20 years and older who participated in the 1998 Korean National Health and Nutrition Survey. Dietary habit data including: skipping of meals, meal regularity, meal volume, snacking habits, removing fatty portions before eating foods, and dietary supplement intake were collected using a structured questionnaire by interview. Individual smoking data was also collected by interview as part of the health behavior survey. A Chi-square test was used to test the association between the dietary habits and smoking. 66.9% of the men were smokers (daily current or occasional current), while only 6.7% of women smoked. On average, 34.7% of the subjects were smokers. Smokers were more likely than nonsmokers to engage in the following dietary habits considered unhealthy: skipping breakfast, meal irregularity, large dinners, small breakfasts, frequently eating out, and eating food without removing the fatty portion. Therefore, Korean smokers should be provided education to assist them in making healthy dietary choices such as: eating regular meals, small dinners, and removing fatty portion of foods. The survey also revealed that a substantial percentage (about 20%) of the subjects were taking some kind of dietary supplement, regardless of smoking status. It is, therefore, also necessary to inform the general public that a balanced diet is the ideal way to obtain nutrients for optimal health.

Key words: smoking, dietary habits, Korean Health and Nutrition Survey

INTRODUCTION

Smoking is a major cause of preventable disease and premature death in both industrialized (1-4) and developing countries (5,6). Smoking is also associated with unhealthy dietary habits that further increase the risk of cardiovascular disease (7,8) and cancer (9,10).

Evidence from numerous studies suggest that the anthropometric and hematological abnormalities associated with smoking may be a result of complex metabolic effects of the numerous chemicals released from tobacco smoke (11-13), as well as a result of different habits or lifestyles between smokers and non-smokers (14-18). Not only does cigarette smoking itself lead to serious health problems, but considerable data also suggest that cigarette smoking is often accompanied by other lifestyle behaviors that affect health and chronic disease risk (19-21). Greater alcohol intake, low levels of physical activity, and especially poor quality diets may be important features of the unhealthy lifestyle behaviors of smokers (22,23).

Various epidemiologic studies in both developing & developed countries have demonstrated that smokers and non-smokers differ in their dietary habits (5,24-27). Investi-

gating relationships among health risk behaviors is important for both individuals as well as for society at large because of the burden of escalating health care expenditures (28,29). European and American studies have shown that smokers typically have higher intakes of energy and fat due to larger meals, irregular meals, and lower intakes of antioxidant vitamins and fiber because of skipping meals (30-33).

The purpose of this study was to investigate differences between the dietary habits of Korean smokers and non-smokers, and to compare the differences in dietary habits of Korean smokers with those of European and American smokers.

SUBJECTS AND METHODS

Study subjects

This study utilized data collected from the Korean National Health and Nutrition Survey (34), which was conducted in November and December 1998. The survey sample was comprised of 11,525 persons (3,799 households) representing the Korean population of age 1 year and older.

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

Data collection & processing

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

Trained interviewers conducted health behavior surveys on drinking, smoking, exercise and sleeping habits with a structured questionnaire. Subjects were categorized by cigarette smoking habits as: never smoked, ex smoker, or current smoker. Current smoker was defined as those who have smoked ≥ 1 cigarette/day for ≥ 1 year; and ex-smoker was defined as those who had stopped ≥ 1 year before the survey. The questionnaire was carefully designed to obtain representative information about the smoking habits of the Korean population. A dietary behavior survey was also carried out with a structured questionnaire by trained dietitians. Subjects were interviewed at their homes.

Statistical analysis

For analysis, subjects were categorized into four different smoking exposure groups such as daily current smoker, occasional current smoker, ex-smoker and nonsmoker. This classification is adopted from a published report (35). The data for most measurements were approximately normally distributed. Age and sex variables were adjusted for standardization of subject numbers in each age and gender group. Duncan's multiple range test was used to evaluate differences in smoking status among the four groups; chi-square tests were used to test the associations between dietary habits and smoking status. In all statistical tests, the null hypothesis was rejected at $p < 0.05$.

RESULTS AND DISCUSSION

Age and sex distribution of subjects

Table 1 shows the distribution of subjects by age and sex. Of the 7,370 subjects, 46.5% were male and 53.5% were female. This gender distribution agrees within a 3% error rate with that of the entire Korean population in this age group (36). The strength of the 1998 Korean National Health and Nutrition Survey is that the survey is represen-

Table 1. Distribution of subjects by age and gender

Variable	Unit: number (%)		
	Male	Female	Total
Age (years)			
20~29	653 (8.9)	766 (10.4)	1419 (19.3)
30~39	922 (12.5)	944 (12.8)	1866 (25.3)
40~49	720 (9.8)	741 (10.1)	1461 (19.8)
50~59	511 (6.9)	593 (8.1)	1104 (15.0)
60~64	242 (3.3)	304 (4.1)	546 (7.4)
≥ 65	378 (5.1)	596 (8.1)	974 (13.2)
Total	3426 (46.5)	3944 (53.5)	7370 (100.0)

tative of the Korean population with respect to gender, age and socio-demographic characteristics. Therefore, the data used in this study accurately reflect the dietary and smoking habits of the Korean population.

Prevalence of smoking

Subjects were assigned to one of four categories according to smoking status: current smoker, occasional current-smoker, ex-smoker and never smoked. 66.9% of male and 6.7% of female subjects were either daily or occasional current smokers (Table 2). The prevalence of male smoking in Korea was quite high when compared with many other countries, including 30% of British ('96 Health Survey of England), 35.6% of Germans (OECD, Health-Data 98), and 25.3% of Americans (US DHHS, 1998 RRFSS). However, the prevalence of smoking by females was lower than was reported in the same countries: 27% of British, 21.5% of Germans, and 20.9% of Americans. However, each study used a slightly different smoker classification system than was used in this study.

Dietary habits

For testing the associations between dietary habits and smoking, the subjects were only categorized as smokers or non-smokers. Daily current smokers and occasional current smokers were aggregated into the smoker category, and subjects in the ex-smoker and never smoked categories were considered non-smokers. This classification was recommended by Jenei et al. (37) to demonstrate the effect of smoking on health risk factors in large population studies. As shown in the Table 3, meal irregularity, frequent eating out, and consuming food without removing the fatty portion were more common among smokers than non-smokers.

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

Smoking status	Sex				Total (n=7370)
	Male		Female		
	(n=3426)	Prevalence	(n=3944)	Prevalence	
Daily current smoker	2159	63.4	236	6.0	2395 (32.5)
Occasional current smoker	118	3.5	29	0.7	147 (2.0)
Ex-smoker	560	16.5	103	2.6	663 (9.0)
Never smoked	575	16.6	3597	91.2	4140 (56.5)
Total	3404	100.0	3944	100.0	7370 (100.0)

The unhealthy dietary habits of Korean smokers were similar to those of Europeans (38) and Americans (39). The higher tendency of smokers than non-smokers for meal irregularity has been a consistent trend in studies of Europeans, Americans (38,39) and Asians, including Koreans (40). Di Lorenzo et al. (41) demonstrated that tobacco smoke exposure affects mood function, and Grunberg (42) found that smoking causes perturbations in appetite or attitudes toward food. Loss of appetite might be responsible for the lack of snacking among Korean smokers. Smoking effects on dietary habits might have very different implication for nutritional risk for different age groups. Smoking induced appetite loss does not lead undernutrition among the relatively young Korean population, such as adolescents (40,43) and young adults (44), but it causes serious undernutrition problems for elderly Koreans (45). Therefore, elderly Korean smokers need more rigorous nutritional attention to avoid serious nutritional deficiencies.

As also shown in Table 3, smoking was not associated with skipping meals, meal volume (overeating or under-

eating), or dietary supplements use. Although there was no significant difference in skipping meals between smokers and non-smokers, smokers tended to skip breakfast more often, while non-smokers tended to skip lunch and dinner (Table 4-1). The most common reasons given by smokers for skipping meals were sleeping late and lack of time; while digestive problems was the major reason for the non-smokers (Table 4-2). As shown in the Table 3, overeating and undereating are not significantly associated with smoking status in Koreans, however, smokers were more likely to overeat at dinner while non-smokers were more likely to overeat at breakfast and lunch (Table 5).

Among the undereating subjects, smokers were more likely to undereat at breakfast than non-smokers, while non-smokers more often undereat at dinner (Table 6). Regardless of smoking status, subjects who did not overeat or undereat were practicing healthy dietary habits such as keeping regular meals.

Therefore, skipping breakfast, small breakfasts, and larger meals for dinner are common unhealthy dietary practices

Table 3. Distribution of smokers & non smokers by their dietary habits

Dietary habit variables	Smoking status		Significance	
	Smoker (daily current + occasional current)	Non-smoker (ex-smoker + never smoker)	χ^2	P
Meal time				
regular	1754 (23.8) ¹⁾	3504 (47.5)	14.851	0.001
irregular	804 (10.9)	1308 (17.9)		
Skipping meal				
yes	1291 (50.5)	2376 (49.3)	0.997	0.318
no	1267 (49.5)	2436 (50.7)		
Large meal (over eating)				
yes	1538 (23.8)	2923 (47.5)	14.651	0.001
no	1020 (10.9)	1889 (17.9)		
Small meal (under eating)				
yes	1619 (21.9)	3133 (42.5)	2.238	0.135
no	939 (12.7)	1679 (22.9)		
Snack				
yes (> 1 per day)	1668 (22.6)	3539 (48.0)	57.775	0.001
no	890 (12.1)	1273 (17.4)		
Eat out				
frequent (> 1 per day)	697 (27.3)	730 (15.1)	185.900	0.001
less frequent (> 1 per week + > 1 per week)	1098 (42.9)	2186 (45.3)		
none	763 (29.8)	1896 (39.6)		
Removing fatty portion before eat				
no	1170 (45.7)	1318 (27.3)	273.800	0.001
partly yes	1227 (47.9)	3049 (63.2)		
yes	161 (6.4)	445 (9.5)		
Dietary supplement consumption				
yes	499 (19.5)	926 (19.2)	0.110	0.738
no	2059 (80.5)	3886 (80.8)		
Total	2558 (100.0)	4812 (100.0)		

¹⁾Percentage.

Table 4-1. Distribution of smokers & non-smokers who skipped meals by meal time

Meal time	Smoking status		Significance	
	Smoker	Non-smoker	χ^2	p
Breakfast	980 (70.6) ¹⁾	1466 (57.4)	75.644	0.001
Lunch	275 (19.8)	677 (26.5)		
Dinner	127 (9.1)	412 (16.1)		
Total	1388 (100.0)	2555 (100.0)		

¹⁾ Percentage.**Table 4-2.** Distribution of smokers & non-smokers skipping meal by reason for skipping meals

Reasons	Smoking status		Significance	
	Smoker	Non-smoker	χ^2	p
Late sleeping	238 (18.6) ¹⁾	248 (10.1)	152.2	0.001
Digestion problem	371 (29.1)	821 (33.5)		
Snack (replacing)	42 (3.4)	181 (7.3)		
Weight control	32 (2.6)	244 (10.0)		
Economic purpose	9 (0.1)	9 (0.4)		
Lacking time	343 (26.8)	557 (22.7)		
Habit	249 (19.4)	391 (16.0)		
Total	1281 (100.0)	2451 (100.0)		

¹⁾ Percentage.**Table 5.** Distribution of smokers & non-smokers who overeat (meal volume) by which meal skipped

Meal time	Smoking status		Significance	
	Smoker	Non-smoker	χ^2	p
Breakfast	22 (1.3) ¹⁾	80 (2.5)	31.7	0.001
Lunch	283 (17.1)	719 (22.9)		
Dinner	1349 (81.6)	2344 (74.6)		
Total	1654 (100.0)	3143 (100.0)		

¹⁾ Percentage.**Table 6.** Distribution of smokers & non-smokers who undereat (meal volume) by meal undereaten

Meal time	Smoking status		Significance	
	Smoker	Non-smoker	χ^2	p
Breakfast	1369 (78.6) ¹⁾	2353 (69.8)	71.9	0.001
Lunch	206 (11.8)	393 (11.7)		
Dinner	166 (9.6)	623 (18.5)		
Total	1741 (100.0)	3369 (100.0)		

¹⁾ Percentage.

of Korean smokers.

In an earlier study, Kim (46) observed that differences in food intake patterns between male and female Koreans are affected by smoking. One observation was that female Korean smokers had a higher beverage intake than their non-smoker counterparts, but a similar beverage intake to male smokers. Therefore, the study concluded that high consumption of beverages is a characteristic of Korean smokers of both genders. Kim (46) also observed that fat intake

was not statistically different between Korean smokers and non-smokers.

In summary, Korean smokers had unhealthy dietary habits which were similar to those of Europeans and Americans, and can lead to serious nutritional imbalance, especially for the elderly population. The study also revealed that about 20% of Koreans take some kinds of dietary supplements, regardless of smoking status. In 1996, Lee et al. (47) reported that about 40% of Korean subjects in their study used some kind of nutritional supplements, and that higher age, educational level, and family income are associated with increased supplement use. Five years later, another study (48) found that dietary supplements were taken by 63.6% of college students. Subjects reporting a high interest in nutrition and health were more likely to use dietary supplements. However, unlike Europeans & Americans, Koreans appear to rely more heavily on dietary supplements and have strong beliefs about dietary supplements, regardless smoking status. Lee et al. (48) found that there is a higher incidence of dietary supplement use in Korea than most other countries. Therefore, it is necessary to provide nutrition education for the general public, regardless of smoking status, concerning the health advantages of obtaining nutrients from a balanced diet.

REFERENCES

1. Prattala R, Karisto A, Berg MA. 1994. Consistency and variation in unhealthy behavior among Finnish men 1982-1990. *Soc Sci Med* 39: 115-122.
2. Renaud S, de Lorgeril M. 1993. The French Paradox: Dietary factors and cigarette smoking-related health risks. *Ann N Y Acad Sci* 686: 299-309.
3. Sherwood NE, Hennrikus DJ, Jeffery RW, Lando HA, Murray DM. 2000. Smokers with multiple behavioral risk factors: How are they different?. *Pre Med* 31: 299-307.
4. Hoogerbrugge N, Domburg R, Zwet E, Kemenade M, Bootsma A, Simoons ML. 2001. High fat intake in hyperlipidaemic patients is related to male gender, smoking, alcohol intake and obesity. *Netherland J Med* 59: 16-22.
5. Woo J, Ho SC, Sham A, Leung SS, Lam TH, Janus ED. 2001. Dietary habit of smoker in a Chinese population. *Int J Food Sci Nutr* 52: 477-84.
6. Kang MH, Lim SS. 1994. The effect of ginseng on the frequency of sister chromatid exchanges of human lymphocyte of adult smokers. *Korean J Nutr* 27: 253-262.
7. Doherty SC, Steptoe A, Rink E, Kendrick T, Hilton S. 1998. Readiness to change health behaviors among patients at high risk of cardiovascular disease. *J Cardiovasc Risk* 5: 147-153.
8. Crossen K, Scott RS, McGeoch GR, George PM. 2001. Implementation of evidence based cardiovascular risk treatments by general practitioners. *N Z Med J* 114: 260-262.
9. Wardle J, Waller J, Brunswick N, Jarvis MJ. 2001. Awareness of risk factors for cancer among British adults. *Public Health* 115: 173-174.
10. Fries E, Meyer A, Danish S, Stanton C, Figueiredo M, Green S, Brunelle J. 2001. Cancer prevention in rural youth: teaching goals for health: the pilot. *J Cancer Educ* 16: 99-104.
11. Kim JH, Lee HW, Kim KW. 1999. Dietary intake, serum

- lipids and hematological indices in female adolescent smokers. *Korean J Community Nutr* 4: 149-156.
12. Kim SH, Shin HS, Lim WK. 2001. A study on the dietary nutrient intake and blood profiles of smoking teenage girls living in a rural community in Korea. *Korean J Nutr* 34: 338-347.
 13. Kim JH, Lee HS, Moon JS, Kim K. 1997. A study on dietary intakes and nutritional status in college women smokers- I. Anthropometric measurement and nutrient intakes. *Korean J Com Nutr* 2: 33-43.
 14. Craig TJ, Van Natta PA. 1977. The association of smoking and drinking habits in a community sample. *J Stud Alcohol* 38: 1434-1439.
 15. Smith JL, Hodges RE. 1987. Serum levels of vitamin C in relation to dietary supplemental intake of vitamin C in smokers and non smokers. *Ann NY Acad Sci* 498: 144-152.
 16. Blair A, Blair SN, Howe HG, Pate RR, Rosenberg M, Parker GM, Pickle LW. 1980. Physical, psychological and sociodemographic differences among smokers, ex smokers and non smokers in a working population. *Prev Med* 9: 747-749.
 17. Raymond GB, Patrick O, Nico P, Agnes T. 2000. Health behaviors of smokers, ex-smokers, and never smokers in an HMO. *Prev Med* 31: 177-182.
 18. Ma J, Betts NM, Hampl JS. 2000. Clustering of life style behaviors: The relationship between cigarette smoking, alcohol consumption, and dietary intake. *Am J Health promotion* 15: 107-117.
 19. Sherwood NE, Hennrikus DJ, Jeffery RW, Lando HA, Murray DM. 2000. Smokers with multiple behavioral risk factors: How are they different?. *Pre Med* 31: 299- 307.
 20. Klesges RC, Eck LH, Isbell TR, Fulliton W, Hanson CL. 1990. Smoking status; effect on the dietary intake, physical activity and body fat of adult men. *Am J Clin Nutr* 51: 784-789.
 21. Kronenfeld JJ, Goodyear N, Pate R, Blair A, Howe H, Parker G, Blair SN. 1988. The interrelationships among preventive health habits. *Health Educ Res* 3: 317-323.
 22. Kim SH, Han KH. 1998. Prevalence of drug abuse and smoking and dietary behavior of male students at technical high school. *Korean J Nutr* 31: 939-948.
 23. Shah M, French SA, Jeffery RW, McGovern PG, Foster JL, Lando HA. 1993. Correlates of high fat/ calories intake in a worksite population: The healthy worker project. *Addict Behav* 18: 583-594.
 24. Osler M, Tjonneland A, Suntum M, Thomsen BL, Stripp C, Gronbaek M, Overvad K. 2002. Does the association between smoking status and selected healthy foods depend on gender? A population based study of 54,417 middle-aged Danes. *Eur J Clin Nutr* 56: 57-63.
 25. Morabia A, Curtin F, Bernstein MS. 1999. Effects of smoking and smoking cessation on dietary habits in a Swiss urban population. *Eur J Clin Nutr* 53: 239-243.
 26. Cade JE, Magarets BM. 1991. Relationship between diet and smoking is the diet of smoker different?. *J Epidemiol Community Health* 45: 270-272.
 27. Beser E, Baytan SH, Akkoyunlu D, Gul M. 1995. Cigarette smoking, eating behavior, blood hematocrit level and body mass index. *Ethiop Med J* 33: 155-162.
 28. Harville DA. 1977. Maximum likelihood approaches to variance component estimation and to related problems. *J Am Stat Assoc* 72: 320-338.
 29. Stamler J, Rains-Clearman D, Leng- Liteow K, Tillotson TC, Grandits GA. 1977. Relationship of smoking at baseline and during trial years 1-6 to food and nutrient intakes and weight in the special intervention and usual care groups in the multiple risk factor intervention trial. *Am J Clin Nutr* 65: 374-402.
 30. Palaniappan U, Jacobs SL, O'Loughlin J, Gray-Donald K. 2001. Fruit and vegetable consumption is lower and saturated fat intake is higher among Canadians reporting smoking. *J Nutr* 7: 1952-1958.
 31. Bottoni A, Cannella C, Del BV. 1997. Lifestyle and dietary differences in smokers and non-smokers from an Italian employee population. *Public Health* 111: 161-164.
 32. Posner BM, Cupples LA, Frang MM, Gagnon DR. 1993. Diet and heart disease risk factors in adult American men and women: the Framingham offspring-spouse nutrition studies. *Int J Epidemiol* 22: 1014-1025.
 33. Curtin F, Morabia, Bernstein MS. 1999. Relation of environmental tobacco smoke to diet and health habits: Variation according to the site of exposure. *J Clin Epidemiol* 52: 1055-1062.
 34. Ministry of Health and Welfare. 1999. Report of National Health and Nutrition Survey-Nutrition Survey Report-#11-1460000-00530-12.
 35. Ministry of Health and Welfare. Korea Institute for Health and Social Affair. 1999. Report of 1998 National Health and Nutrition Survey: Health Behavior Survey. Ministry of Health and Welfare, Seoul. p 65-84.
 36. The National Statistical Office. 1998. *Statistical Year Book*. Musung Publishing Co, Seoul. p 33-39.
 37. Jenei Z, Pall D, Katono E, Polgar P, Karany Z, Bodor M, Kakuk G. 2000. Prevalence of cardiovascular risk factors of the smoker and non-smokers in the city of Debrecen, Hungary. *Public Health* 114: 295-299.
 38. Whichelow MJ. 1991. A comparison of the diets of non-smokers and smokers. *Br J Addict* 86: 71-81.
 39. Morabia A. 1990. Dietary habits of smoker, people who never smoked, and ex smokers. *Am J Clin Nutr* 52: 933-937.
 40. Kim SH, Han KH. 1998. Prevalence of drug abuse and smoking and dietary behavior of male students at technical high school. *Korean J Nutrition* 31: 939-948.
 41. Di Lorenzo TM, Walitzer KS, Sher KJ, Farha Z. 1991. The effect of smoking cessation on food craving. *J Subst Abuse* 3: 117-122.
 42. Grunberg NE. 1982. The effect of nicotine and cigarette smoking on food consumption and taste preference. *Addict Behav* 7: 317-331.
 43. Kim KN, Lee SS, Hyun T. 2002. Food behaviors, nutrient intake, clinical symptoms and hematological findings by smoking status among male high school student. *J Korean Diet Assoc* 8: 260-268.
 44. Kwak CS, Lee JW, Hyun WJ. 2000. The effects of smoking and alcohol drinking on nutritional status and eating habits in adult males. *Korean J Com Nutr* 5: 161-171.
 45. Joung H, Moon HK. 1999. Dietary differences in smokers and non-smokers from free living elderly in Kyunggi province. *Korean J Nutrition* 32: 812-820.
 46. Kim Y. 2002. Differences in food and nutrient intake associated with smoking status of Korean. *Korean J Com Nutr* 4: 22-28.
 47. Lee SS, Choi IS, Lee KH, Choi UJ, Oh SH. 1996. A study on the nutrients intake and serum lipid pattern in smoking college men. *Korean J Nutr* 29: 489-498.
 48. Lee MY, Kim JS, Cheong SH, Chang KJ. 2001. A study on usage of dietary supplements and related factors in college students attending web class via internet. *Korean J Nutr* 34: 946-955.