

Original Article

Relationship of cigarette smoking status with other unhealthy lifestyle habits in Japanese employees

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Objective: To clarify the relationship of the cigarette smoking status with other unhealthy lifestyle habits in Japanese employees.

Methods: A cross-sectional questionnaire survey was conducted in 4009 males and 1620 females. Multivariate logistic regression analysis was performed to evaluate the relationship between the cigarette smoking status and each survey item of the lifestyle habits after adjusting for potential confounding factors. Multivariate regression analysis was performed to evaluate the relationship of the duration of smoking cessation with other lifestyle habits.

Results: In both genders, compared to nonsmokers, current smokers drank more sugar-sweetened beverages (odds ratio 2.01 in males, 1.93 in females), preferred strong flavors (OR 2.23 in males, 1.64 in females), added soy sauce to cooked meals (OR 3.02 in males, 1.92 in females), skipped breakfast (OR 2.54 in males, 5.42 in females), and drank more alcohol (OR 2.28 in males, 3.24 in females). The current smokers ate snacks, fruit, soy beans and milk products less frequently. Particularly in males, current smokers took less regular exercise, had less physical activity and more sleep problems. The duration of smoking cessation in males was significantly and positively related with physical activity ($\beta = 0.052$, $p < 0.01$) and was inversely related with the score for undesirable eating habits ($\beta = -0.160$, $p < 0.01$) and alcohol consumption ($\beta = -0.089$, $p < 0.01$, adjusted $R^2 = 0.124$).

Conclusion: Current smokers had multiple unhealthy lifestyle habits compared to nonsmokers in both genders. In addition, the duration of smoking cessation in males appeared to be significantly related to a change in unhealthy lifestyle habits.

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Key Words: smoking, lifestyle, cross-sectional study, employee, Japan

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Introduction

Cigarette smoking is an important risk factor for cardiovascular disease, cancer, and other diseases¹⁾, and an aggravating factor for metabolic syndrome^{1,2)}. As compared with nonsmokers, current smokers have been reported to exercise less regularly, to skip breakfast more often, to eat more quickly, and to eat a greater amount of salty foods, fewer vegetables, less fruit, fewer soy bean products^{3,4)}, and to have higher alcohol consumption^{4,5)}. Thus, smokers accumulate unhealthy lifestyle habits other than smoking³⁻⁵⁾; therefore, some investigators⁶⁾ claim that the clustering of unhealthy lifestyle habits in an individual has multiple effects on the risk of cardiovascular disease, cancer, and other diseases.

Concerning the relationship of smoking with eating habits, daily drinkers have been reported to consume a greater amount of salty food, instant food, and more salted dried fish⁴⁾; however, few studies have examined the relationship of smoking with eating habits by adjusting for the effects of alcohol consumption on eating habits^{3,4)}. Among ex-smokers, the duration of smoking cessation was found to be related with a decrease in the ingestion of an unbalanced diet and alcohol intake^{7,8)}; however, little information is available about the impact of smoking cessation on the improvement of lifestyle habits, such as a decrease in alcoholic consumption. In addition, previous studies have not comprehensively examined the relationship of smoking with physical activity, eating habits, alcohol consumption, sleep problems, global health status and the psychological health status. It

is important to comprehensively explore the smoking status-related unhealthy lifestyle habits. Such findings would benefit both smokers and their healthcare professionals for better and more effective health counseling.

The aim of this study was therefore to clarify the relationship of the cigarette smoking status with other unhealthy lifestyle habits.

Methods

Study participants

We conducted a cross-sectional study of 6,264 employees (4,504 males and 1,760 females) who underwent annual health check-ups from April 2009 to March 2010 either at Osaka Medical Center for Health Science and Promotion in Japan or on-site at each affiliate company. All employees of 11 companies which had a contract for annual health check-ups with our Medical Center participated in the present study without exception. The participants worked in various categories, such as finance, broadcasting, manufacturing, transportation and others. Each participant had company health insurance. The occupational groups of participants were office clerks (37.3%), sales (18.2%), technical specialists (17.5%), managerial and supervisory (16.2%), manufacturing (4.2%), and others (6.6%). We excluded participants who were younger than 20 years old ($n = 13$), and who had errors in check-up items ($n = 622$). Information from 5,629 (4,009 males and 1,620 females) participants was analyzed; however, 4,004 (2,702 males and 1,302 females) participants who underwent an annual health checkup at Osaka Medical Center were asked to answer a follow-up health questionnaire on their global health status and sleep problems.

The study protocol was approved by the Ethics Committee of Osaka Medical Center for Health Science and Promotion in Japan.

Health questionnaire

Lifestyle habits were determined by a structured interview or by a self-administered health questionnaire. The health questionnaire was distributed to the participants three to four weeks prior to the day of the health check-up.

Cigarette smoking status: We asked the participants if they had smoked ≥ 1 cigarette every day (current smoker) or they had previously smoked ≥ 1 cigarette every day and had not smoked until they filled in the health questionnaire (ex-smoker) or they had never smoked in the past (non-smoker). We asked the ex-smokers about their age when they started to smoke and when they had stopped. We assumed that the ex-smokers had stopped smoking they received the health questionnaire and filled it in, which usually occurred about 3 weeks before the health check-up. Current and ex-smokers were asked about the average number of cigarettes smoked per day. We classified the number of cigarettes smoked per day in current smokers into 3 categories: 1–10 (light smokers), 11–20 (middle smokers), and ≥ 21 cigarettes per day (heavy smokers). We classified the years since cessation in ex-smokers into 3 categories: < 3 (short duration), 3–4 (intermediate duration), and ≥ 5 years (long duration).

Physical activity⁹⁾: We asked the participants if they performed regular exercise and activities of daily living. If the answer was “yes,” we asked about the type of physical activities, such as walking and those related with daily household chores, and their fre-

quency. A respondent was regarded as a regular exerciser if they exercised more than 4 metabolic equivalent-hours per week (MET-hours/week), or if they performed physical activity for more than 23 MET-hours/week as the sum of exercise and activities of daily living.

Eating habits¹⁰⁾: We asked 20 questions about eating habits, such as, “Did you often skip breakfast during the last month?” The answer choices were yes or no. The eating habit questionnaire was composed of 4 categories: overeating (5 items), fat consumption (4 items), salt consumption (6 items), and nutritional balance (5 items).

Alcohol consumption: We asked the participants about alcohol consumption (current drinking or nondrinking). Current drinkers were then asked about their weekly frequency of alcohol consumption and the usual amount consumed daily. The categorization was based on *go*, a unit of measurement that equals 180 ml and is the traditional unit for Japanese *sake*, which contains 13% alcohol (equivalent to approximately 23 grams of ethanol).

Global health status: We asked the participants to rate their own current health as excellent, very good, fair or poor. A respondent was regarded as having a poor global health status if the answer was fair or poor.

Psychological health status^{11–13)}: Concerning perceived stress¹¹⁾, we asked the participants if they suffered very often, often, seldom or never. A respondent was regarded as perceiving stress if the answer was very often¹¹⁾. To measure depressive symptoms, we extracted 2 items for depressive symptoms from the Primary Care Evaluation of Mental Disorders

(PRIME–MD)¹², i.e., “little interest or pleasure in doing things” and “feeling down, depressed, or hopeless”. These questions were originally answered by yes or no and therefore we used these questions similarly in this study. A respondent was regarded as depressed if they answered “yes” to both of the components¹³ or were currently being treated for mental illness. The validation of these questions on the psychological health status was confirmed in our previous study¹¹ in which we reported a significant relationship between stress and depression and current smoking in females after adjusting for age.

Sleep problems: Concerning sleep problems, participants responded for the 3 months before the health check–up and we asked them about their average sleep time per day. A respondent was regarded as having sleep problems if they slept less than 6 hours per day¹¹. Information on snoring (more than once a week) and sleep apnea (yes or no) was obtained from a family member, if any. ‘Family member’ referred to any cohabiter, regardless of kinship. If the family member was not able to answer these questions or the participant was living alone, we excluded those participants from the analysis. A total of 387 males and 353 females were excluded because of the absence of information on snoring. Concerning sleep apnea, 737 males and 402 females were excluded for the same reason.

Socioeconomic status

We categorized the participants based on occupation and their position in society according to a previous study⁸: professional, administrative or not, because the cigarette smoking status is related to social class⁷; therefore, we used this category for social

class adjustment.

Anthropometric measurements

We calculated the body mass index as weight divided by the square of height in meters. Clinical laboratory staff measured waist circumference at the umbilical level in unclothed, standing participants after normal expiration.

Statistical analysis

We estimated the magnitude of the relationship between the cigarette smoking status and each of the unhealthy behaviors using logistic regression analysis. Odds ratios and 95% confidence intervals (CIs) were calculated by multivariate adjustment, which included age (continuous), socioeconomic status (professional, administrative or not), score for undesirable eating habits (one point was given for each undesirable habit; continuous), regular physical activity (yes or no; dichotomous) and alcohol consumption status (current drinking or nondrinking; dichotomous).

Multivariate regression analysis was performed to evaluate the relationship of the duration of smoking cessation with other lifestyle habits, excluding non–smokers, who underwent an annual health checkup at Osaka Medical Center. The duration of smoking cessation was assumed to be 0 for current smokers. Independent variables in this analysis were as follows: the amount of physical activity (MET–hours/week), score for undesirable eating habits, alcohol consumption (grams of ethanol per week), perceived stress, depressive symptoms, poor global health status, and sleep problems (snoring and/or sleep apnea). These variables were analyzed after adjustment for age and socioeconomic status. Data were analyzed using the SPSS/PC statistical

package (15.0 J for Windows). $P < 0.05$ was regarded as significant.

Results

Table 1 shows the characteristics of the participants by the cigarette smoking status among males and females. The prevalence of current smokers, ex-smokers and non-smokers was 33.6% ($n=1,348$), 32.6% ($n=1,306$) and 33.8% ($n=1,355$) in males, and 10.9% ($n=177$), 8.1% ($n=131$) and 81.0% ($n=1,312$) in females, respectively. The mean age and standard deviation (SD) of the enrolled participants was 46.1 (SD10.6) years in males and 40.4 (SD11.6) years in females. Particularly in males, significant differences were observed between current/ex-smokers and non-smokers.

Table 2 shows the relationship between current/ex-smokers and each of the survey items of lifestyle habits in males. Compared to non-smokers, current smokers were found to have several characteristics: they more often went to bed within 1-2 hours after dinner (odds ratio, 1.26, 95% confidence interval: 1.07-1.47; they drank more sugar-sweetened beverages (2.01: 1.71-2.36), ate quickly (1.25: 1.07-1.46), preferred strong flavors (2.23: 1.89-2.63), drank almost all noodle soup (1.35: 1.14-1.59), added soy sauce to cooked meals (3.02: 2.52-3.61), ate pickles (1.59: 1.18-2.14), skipped breakfast (2.54: 2.11-3.05), drank more alcohol (2.28: 1.87-2.77). They also snored more frequently (1.34: 1.08-1.67) and had more sleep apnea (1.44: 1.09-1.91). Moreover, they took regular exercise, and performed physical activity less frequently. Finally, by multivariate adjustment, they ate until full, eat snacks, sea-

food, vegetables, fruit, soy bean products and milk products less frequently. Among current smokers, the daily cigarette consumption was significantly related with eating snacks, drinking sugar-sweetened beverages, eating quickly, eating fatty meat, preferring strong flavors, adding soy sauce to cooked meals, skipping breakfast and eating less fruit and milk products ($P < 0.05$ for trend, respectively). Ex-smokers who had quit for ≥ 5 years still ate quickly, preferred strong flavors, added soy sauce to cooked meals, drank more alcohol and had sleep problems.

Table 3 shows the relationship between current/ex-smokers and each of the survey items of lifestyle habits in females. Compared to non-smokers current smokers drank more sugar-sweetened beverages (odds ratio 1.93, 95% confidence interval: 1.39-2.68), preferred strong flavors (1.64: 1.17-2.28), added soy sauce to cooked meals (1.92: 1.20-3.06), skipped breakfast (5.42: 3.79-7.73), and drank more alcohol (3.24: 2.23-4.71). Moreover, they ate snacks, eggs, fruit, soy beans and milk products less frequently.

Table 4 shows the results of multivariate regression analysis, which was performed to evaluate the relationship of the duration of smoking cessation with other lifestyle habits. The duration of smoking cessation in males was significantly and positively associated with physical activity ($\beta = 0.052$, $p < 0.01$) and was inversely related with the score for undesirable eating habits ($\beta = -0.160$, $p < 0.01$) and alcohol consumption ($\beta = -0.089$, $p < 0.01$, adjusted $R^2 = 0.124$). On the other hand, in females, the relationship of the duration of smoking cessation with these variables was not statistically significant.

Table 1 Characteristics of the subjects by cigarette smoking status among males and females

	Males				Females			
	Current smoker (N=1,348)	Ex-smoker (N=1,306)	Nonsmoker (N=1,355)	P-value	Current smoker (N=177)	Ex-smoker (N=131)	Nonsmoker (N=1,312)	P-value
Age, Anthropometric measurements								
Age (years)	46.2(SD10.4)	49.6(SD 9.6)	42.8(SD10.8)	<0.001	42.8(SD10.4)	42.9(SD10.4)	39.8(SD11.8)	<0.001
Waist circumference (cm)	84.1(SD 9.0)	84.9(SD 8.0)	83.0(SD 9.2)	<0.001	74.7(SD 8.6)	75.8(SD 8.6)	74.0(SD 9.0)	0.079
Weight (kg)	69.2(SD10.9)	69.7(SD 9.7)	68.8(SD10.7)	0.110	53.2(SD 8.5)	54.0(SD 8.8)	52.7(SD 8.3)	0.230
Body mass index (kg/m ²)	23.7(SD 3.4)	24.0(SD 3.0)	23.6(SD 3.4)	0.020	21.2(SD 3.0)	21.5(SD 3.3)	21.0(SD 3.2)	0.184
Socioeconomic status								
professional	308 (22.8)	395 (30.2)	203 (15.0)	<0.001	2 (1.1)	2 (1.5)	6 (0.5)	0.669
administrative	260 (19.3)	282 (21.6)	340 (25.1)		10 (5.7)	9 (6.9)	86 (6.6)	
other	780 (57.9)	629 (48.2)	812 (59.9)		165 (93.2)	120 (91.6)	1,220 (92.9)	
Physical activity								
Little regular exercise	1,004 (74.5)	779 (59.6)	910 (67.2)	<0.001	150 (84.7)	110 (84.0)	1,069 (81.5)	0.475
Amount of exercise (MET-hours/week)	17.2(SD14.7)	16.7(SD15.2)	17.4(SD14.3)	0.777	13.4(SD 8.8)	14.3(SD13.9)	14.7(SD13.9)	0.884
Little regular physical activity	1,219 (90.4)	1,109 (84.9)	1,172 (86.5)	<0.001	168 (94.9)	125 (95.4)	1,247 (95.0)	0.978
Amount of physical activity (MET-hours/week)	40.3(SD19.0)	37.7(SD18.4)	35.7(SD15.3)	0.080	39.1(SD27.3)	37.6(SD12.5)	37.1(SD16.9)	0.951
Eating habits								
Overeating								
Go to bed within 1-2 hours after dinner	605 (44.9)	530 (40.6)	524 (38.7)	0.004	34 (19.2)	34 (26.0)	264 (20.1)	0.261
Frequently eat until full	767 (56.9)	845 (64.7)	862 (63.6)	<0.001	109 (61.6)	92 (70.2)	848 (64.6)	0.285
Eat snack (almost every day)	191 (14.2)	218 (16.7)	289 (21.3)	<0.001	56 (31.6)	59 (45.0)	579 (44.1)	0.006
Drink sugar-sweetened beverage (almost every day)	646 (47.9)	350 (26.8)	459 (33.9)	<0.001	74 (41.8)	46 (35.1)	375 (28.6)	0.001
Frequently eat quickly	833 (61.8)	857 (65.6)	785 (57.9)	<0.001	89 (50.3)	71 (54.2)	593 (45.2)	0.106
Fat consumption								
Eat fried food (almost every day)	418 (31.0)	350 (26.8)	450 (33.2)	0.001	40 (22.6)	35 (26.7)	317 (24.2)	0.704
Eat eggs (almost every day)	479 (35.5)	465 (35.6)	506 (37.3)	0.542	49 (27.7)	41 (31.3)	508 (38.7)	0.006
Eat fatty meat (≥3 days/week)	598 (44.4)	502 (38.4)	636 (46.9)	<0.001	58 (32.8)	50 (38.2)	515 (39.3)	0.250
Eat seafood (<3 days/week)	725 (53.8)	583 (44.6)	671 (49.5)	<0.001	106 (59.9)	80 (61.1)	770 (58.7)	0.843
Salt consumption								
Frequently prefer strong flavors	584 (43.3)	459 (35.1)	344 (25.4)	<0.001	66 (37.3)	27 (20.6)	345 (26.3)	0.001
Eat miso or other soup (≥2 times/day)	172 (12.8)	202 (15.5)	213 (15.7)	0.055	13 (7.3)	10 (7.6)	107 (8.2)	0.919
Drink almost all noodle soup	456 (33.8)	421 (32.2)	375 (27.7)	0.002	26 (14.7)	15 (11.5)	169 (12.9)	0.690
Eat salty foods (≥3 days/week)	138 (10.2)	158 (12.1)	107 (7.9)	0.001	10 (5.6)	9 (6.9)	108 (8.2)	0.444
Add soy sauce to cooked meal	541 (40.1)	380 (29.1)	235 (17.3)	<0.001	26 (14.7)	17 (13.0)	105 (8.0)	0.004
Eat pickles (≥2 times/day)	130 (9.6)	121 (9.3)	77 (5.7)	<0.001	18 (10.2)	7 (5.3)	72 (5.5)	0.046
Nutritional balance								
Frequently skip breakfast	460 (34.1)	193 (14.8)	280 (20.7)	<0.001	74 (41.8)	36 (27.5)	174 (13.3)	<0.001
Eat vegetables (<3 times/day)	1,011 (75.0)	903 (69.1)	954 (70.4)	0.002	125 (70.6)	97 (74.0)	898 (68.4)	0.376
Eat fruit (<7 days/week)	1,083 (80.3)	886 (67.8)	900 (66.4)	<0.001	143 (80.8)	90 (68.7)	816 (62.2)	<0.001
Eat soy products (<7 days/week)	1,035 (76.8)	808 (61.9)	858 (63.3)	<0.001	125 (70.6)	90 (68.7)	830 (63.3)	0.091
Eat milk products (<7 days/week)	843 (62.5)	689 (52.8)	636 (46.9)	<0.001	86 (48.6)	61 (46.6)	518 (39.5)	0.028
Alcohol consumption								
Current drinker	1,036 (76.9)	1,047 (80.2)	905 (66.8)	<0.001	95 (53.7)	76 (58.0)	484 (36.9)	<0.001
Daily alcohol consumption (grams/day)	41.4(SD29.9)	36.8(SD32.2)	19.9 (SD23.0)	<0.001	27.6(SD18.4)	25.3(SD18.4)	10.7(SD16.1)	0.001
Psychological health status								
Stressed	193 (14.3)	165 (12.6)	184 (13.6)	0.446	24 (13.6)	12 (9.2)	148 (11.3)	0.475
Depressed	81 (6.0)	56 (4.3)	81 (6.0)	0.083	13 (7.3)	6 (4.6)	51 (3.9)	0.104
Global health status								
Poor current health	137 (15.7)	142 (15.5)	126 (13.8)	0.455	19 (13.8)	20 (20.6)	155 (14.5)	0.252
Sleep problems								
Sleeping time (<6 hours/day)	232 (26.5)	201 (22.0)	288 (31.5)	<0.001	37 (26.8)	28 (28.9)	290 (27.2)	0.931
Snoring	488 (64.0)	536 (65.8)	376 (51.0)	<0.001	36 (35.3)	26 (37.7)	200 (25.7)	0.019
Sleep apnea	199 (30.0)	205 (30.4)	110 (17.6)	<0.001	4 (4.3)	3 (5.0)	18 (2.4)	0.329

Age, waist circumference, weight, body mass index, regular physical activity and alcohol consumption are expressed as the mean plus standard deviation; other data are expressed as n (%). Global health status and sleeping time: Number of current smokers, ex-smokers and non-smokers were 874, 914 in males, and 138, 97 and 1,067 in females, respectively. Snoring: Number of current smokers, ex-smokers and non-smokers were 763, 815 and 737 in males, and 102, 69 and 778 in females, respectively. Sleep apnea: Number of current smokers, ex-smokers and non-smokers were 664, 675 and 626 in males, and 94, 60 and 746 in females, respectively.

Table 2 Adjusted odds ratios of current smokers and ex-smokers versus nonsmokers in males

	Current smoker/ Nonsmoker		Ex-smoker/ Nonsmoker		Current smoker/ Nonsmoker		Ex-smoker/ Nonsmoker		P-value for trend ^b	P-value for trend ^b
	(N = 1,348/1,355)	(N = 1,306/1,355)	(N = 257/1,355)	(N = 747/1,355)	(N = 344/1,355)	(N = 249/1,366)	(N = 168/1,355)	(N = 889/1,355)		
Physical activity										
Little regular exercise	1.34(1.13-1.60)**	0.76(0.64-0.90)**	1.44(1.06-1.96)*	1.36(1.10-1.67)**	1.41(1.06-1.86)*	0.642	0.77(0.58-1.03)	0.80(0.57-1.12)	0.77(0.63-0.92)**	0.753
Little regular physical activity	1.54(1.20-1.98)**	1.07(0.85-1.35)	1.72(1.07-2.77)*	1.61(1.19-2.18)**	1.44(0.97-2.13)	0.528	1.40(0.90-2.18)	0.85(0.54-1.34)	1.02(0.79-1.32)	0.255
Eating habits										
<i>Overeating</i>										
Go to bed within 1-2 hours after dinner	1.26(1.07-1.47)**	1.07(0.91-1.27)	1.14(0.87-1.50)	1.16(0.97-1.40)	1.50(1.18-1.92)**	0.064	0.99(0.74-1.30)	1.34(0.96-1.85)	1.08(0.90-1.31)	0.506
Frequently eat until full	0.83(0.71-0.97)*	1.31(1.10-1.55)**	0.75(0.56-0.98)	0.80(0.67-0.97)	0.92(0.72-1.18)	0.102	1.29(0.96-1.73)	1.62(1.13-2.32)**	1.20(0.99-1.46)	0.625
Eat snack (almost every day)	0.70(0.57-0.85)**	0.94(0.77-1.16)	0.48(0.31-0.72)**	0.65(0.50-0.83)**	1.01(0.74-1.37)	<0.001	1.07(0.76-1.51)	0.76(0.49-1.20)	0.88(0.69-1.12)	0.540
Drink sugar-sweetened beverage (almost every day)	2.01(1.71-2.36)**	0.87(0.73-1.04)	1.45(1.10-1.92)**	2.13(1.76-2.57)**	2.50(1.95-3.21)**	0.005	1.21(0.90-1.61)	1.13(0.80-1.59)	0.71(0.58-0.88)**	<0.001
Frequently eat quickly	1.25(1.07-1.46)**	1.52(1.29-1.80)**	1.06(0.81-1.39)	1.19(0.99-1.43)	1.62(1.26-2.09)**	0.003	1.38(1.04-1.83)*	2.00(1.39-2.86)**	1.41(1.17-1.71)**	0.949
<i>Fat consumption</i>										
Eat fried food (almost every day)	1.00(0.85-1.18)	0.92(0.77-1.10)	0.76(0.56-1.02)	1.06(0.87-1.29)	0.99(0.76-1.30)	0.115	1.11(0.83-1.49)	0.89(0.62-1.28)	0.88(0.71-1.08)	0.465
Eat eggs (almost every day)	0.99(0.84-1.16)	1.06(0.90-1.25)	0.83(0.63-1.11)	1.03(0.85-1.25)	1.07(0.83-1.37)	0.175	0.98(0.74-1.31)	1.07(0.76-1.50)	1.06(0.88-1.29)	0.588
Eat fatty meat (≥ 3 days/week)	1.07(0.91-1.26)	1.01(0.85-1.19)	0.77(0.58-1.02)*	1.08(0.89-1.31)	1.24(0.96-1.59)	0.004	1.00(0.75-1.34)	1.48(1.06-2.07)*	0.91(0.75-1.11)	0.524
Eat seafood (< 3 days/week)	1.40(1.19-1.63)**	1.10(0.94-1.30)	1.31(0.99-1.72)	1.37(1.14-1.65)**	1.51(1.18-1.93)**	0.381	1.22(0.92-1.61)	0.86(0.62-1.20)	1.12(0.93-1.35)	0.919
<i>Salt consumption</i>										
Frequently prefer strong flavors	2.23(1.89-2.63)**	1.58(1.33-1.88)**	1.50(1.12-2.00)**	2.40(1.98-2.91)**	2.70(2.11-3.47)**	0.001	2.17(1.64-2.88)**	1.85(1.32-2.60)**	1.40(1.15-1.72)**	0.001
Eat miso or other soup (≥ 2 times/day)	0.82(0.66-1.02)	1.04(0.84-1.30)	0.76(0.51-1.14)	0.82(0.63-1.07)	0.86(0.60-1.22)	0.530	0.95(0.65-1.39)	1.37(0.90-2.06)	1.01(0.79-1.30)	0.902
Drink almost all noodle soup	1.35(1.14-1.59)**	1.28(1.07-1.52)**	1.09(0.81-1.46)	1.42(1.17-1.73)**	1.40(1.08-1.81)*	0.115	1.55(1.17-2.07)**	2.02(1.45-2.81)**	1.05(0.86-1.29)	0.004
Eat salty foods (≥ 3 days/week)	1.18(0.91-1.55)	1.28(0.98-1.68)	1.03(0.62-1.70)	1.30(0.96-1.78)	1.18(0.78-1.76)	0.695	1.21(0.77-1.90)	1.67(1.03-2.70)*	1.14(0.84-1.54)	0.517
Add soy sauce to cooked meal	3.02(2.52-3.61)**	1.76(1.45-2.13)**	2.11(1.56-2.86)**	3.10(2.52-3.81)**	3.97(3.06-5.14)**	0.001	2.22(1.64-3.00)**	2.61(1.84-3.69)**	1.47(1.18-1.84)**	0.001
Eat pickles (≥ 2 times/day)	1.59(1.18-2.14)**	1.35(0.99-1.83)	2.11(1.33-3.34)**	1.35(0.95-1.93)	2.00(1.33-3.00)**	0.888	1.54(0.94-2.50)	1.28(0.70-2.34)	1.24(0.88-1.74)	0.282
<i>Nutritional balance</i>										
Frequently skip breakfast	2.54(2.11-3.05)**	0.98(0.79-1.22)	1.45(1.06-2.00)*	2.59(2.09-3.22)**	3.96(3.01-5.21)**	<0.001	1.35(0.96-1.91)	0.87(0.55-1.38)	0.98(0.75-1.27)	0.089
Eat vegetables (< 3 times/day)	1.36(1.14-1.62)**	1.12(0.94-1.33)	1.04(0.77-1.41)	1.36(1.11-1.68)**	1.58(1.19-2.09)**	0.058	1.21(0.89-1.65)	1.35(0.93-1.94)	1.11(0.91-1.35)	0.476
Eat fruit (< 7 days/week)	2.28(1.90-2.74)**	1.32(1.11-1.57)**	1.73(1.24-2.40)**	2.20(1.76-2.73)**	2.88(2.11-3.94)**	0.028	1.77(1.29-2.44)**	1.76(1.20-2.56)**	1.20(0.99-1.46)	0.008
Eat soy products (< 7 days/week)	2.03(1.71-2.41)**	1.07(0.90-1.26)	1.76(1.29-2.39)**	2.12(1.72-2.61)**	2.15(1.63-2.85)**	0.347	1.28(0.96-1.71)	0.79(0.57-1.09)	1.05(0.87-1.27)	0.427
Eat milk products (< 7 days/week)	1.89(1.62-2.21)**	1.30(1.11-1.53)**	1.34(1.02-1.75)*	2.04(1.69-2.47)**	2.06(1.60-2.64)**	0.030	1.58(1.20-2.09)**	1.86(1.34-2.60)**	1.18(0.98-1.41)	0.011
Alcohol consumption										
Daily alcohol consumption (≥ 46 grams/day)	2.28(1.87-2.77)**	1.67(1.36-2.04)**	2.24(1.64-3.07)**	2.21(1.76-2.77)**	2.76(2.08-3.66)**	0.162	2.17(1.58-2.97)**	1.57(1.06-2.32)*	1.51(1.20-1.90)**	0.032
Psychological health status										
Stressed	1.00(0.80-1.25)	0.95(0.75-1.20)	0.70(0.46-1.09)	0.96(0.73-1.25)	1.05(0.75-1.48)	0.066	0.93(0.62-1.40)	0.95(0.59-1.54)	0.97(0.74-1.28)	0.580
Depressed	0.89(0.64-1.24)	0.72(0.50-1.05)	0.69(0.36-1.31)	0.90(0.60-1.33)	1.01(0.62-1.65)	0.234	1.02(0.58-1.80)	0.87(0.42-1.80)	0.57(0.36-0.90)*	0.048
Global health status										
Poor current health	0.95(0.72-1.25)	1.04(0.79-1.36)	0.85(0.51-1.42)	0.92(0.66-1.28)	1.05(0.70-1.57)	0.353	0.99(0.63-1.58)	1.44(0.87-2.38)	1.01(0.73-1.38)	0.924
Sleep problems										
Sleeping time (< 6 hours/day)	0.71(0.57-0.88)**	0.62(0.50-0.78)**	0.65(0.44-0.96)*	0.71(0.55-0.92)*	0.70(0.48-0.94)*	0.699	0.48(0.32-0.72)**	0.85(0.55-1.31)	0.61(0.47-0.79)**	0.211
Snoring	1.34(1.08-1.67)**	1.53(1.23-1.90)**	1.26(0.86-1.84)	1.17(0.90-1.51)	1.84(1.28-2.65)**	0.059	1.22(0.86-1.75)	1.96(1.23-3.14)**	1.58(1.24-2.02)**	0.147
Sleep apnea	1.44(1.09-1.91)*	1.48(1.12-1.95)**	1.09(0.66-1.81)	1.41(1.02-1.95)*	1.78(1.20-2.65)**	0.079	1.46(0.94-2.27)	2.12(1.29-3.49)**	1.42(1.04-1.94)*	0.801

*p<0.05, **p<0.01, ***p<0.001.

Multivariable-adjusted relative odds ratios (95% confidence interval) are shown.

Physical activity was adjusted for age, socioeconomic status, eating habits score, and alcohol consumption.

Eating habits were adjusted for age, socioeconomic status, regular physical activity, and alcohol consumption.

Alcohol consumption was adjusted for age, socioeconomic status, regular physical activity, and eating habits score.

Other variables were adjusted for age, socioeconomic status, regular physical activity, eating habits score, and alcohol consumption.

Global health status and sleeping time: Number of current smokers, ex-smokers and non-smokers were 874, 914 and 914, respectively.

Snoring: Number of current smokers, ex-smokers and non-smokers were 763, 815 and 737, respectively. Sleep apnea: Number of current smokers, ex-smokers and non-smokers were 664, 675 and 626, respectively.

*The test for trend was calculated across increasing categories of daily cigarette consumption for current smokers only.

*The test for trend was calculated across increasing categories of years after cessation for ex-smokers and current smokers (duration was assumed to be 0).

*The test for trend was calculated across increasing categories of years after cessation for ex-smokers and current smokers (duration was assumed to be 0).

Table 3 Adjusted odds ratios of current smokers and ex-smokers versus nonsmokers in females

	Current smoker/ Nonsmoker		Ex-smoker/ Nonsmoker		Current smoker/Nonsmoker		Ex-smoker/Nonsmoker		P-value for trend ^a
	(N = 177/1,312)	(N = 131/1,312)	1-10 cigarettes/day (N = 108/1,312)	11-20 cigarettes/day (N = 62/1,312)	≥21 cigarettes/day (N = 7/1,312)	<3 years since ces- sation of smoking (N = 39/1,312)	3-4 years since ces- sation of smoking (N = 12/1,312)	≥5 years since ces- sation of smoking (N = 80/1,312)	
Physical activity									
Little regular exercise	1.29(0.83-2.01)	1.24(0.76-2.03)	1.60(0.89-2.86)	1.04(0.53-2.05)	0.59(0.11-3.11)	1.52(0.59-3.94)	2.53(0.32-1.98)	1.03(0.57-1.85)	0.52
Little regular physical activity	1.13(0.54-2.33)	1.29(0.54-3.08)	1.21(0.47-3.10)	1.16(0.35-3.87)	0.41(0.05-3.53)	2.16(0.29-16.15)	0.60(0.08-4.83)	1.27(0.45-3.63)	0.881
Eating habits									
Overeating									
Go to bed within 1-2 hours after dinner	0.92(0.62-1.38)	1.37(0.90-2.08)	0.76(0.45-1.29)	1.27(0.69-2.31)	0.67(0.08-5.59)	1.34(0.64-2.80)	0.74(0.16-3.44)	1.52(0.91-2.55)	0.436
Frequently eat until full	0.93(0.67-1.29)	1.38(0.93-2.05)	0.79(0.53-1.19)	1.25(0.72-2.17)	0.86(0.19-3.89)	4.92(1.73-13.97)**	2.53(0.55-11.68)	0.83(0.52-1.33)	0.002
Eat snack (almost every day)	0.63(0.45-0.89)**	1.16(0.80-1.67)	0.67(0.44-1.03)	0.65(0.37-1.12)	0.26(0.03-2.18)	1.05(0.55-2.01)	1.40(0.44-4.38)	1.15(0.72-1.82)	0.621
Drink sugar-sweetened beverage (almost every day)	1.43(1.39-2.68)**	1.46(0.99-2.15)	1.63(1.08-2.47)*	2.35(1.40-3.96)**	3.37(0.85-17.56)	1.69(0.87-3.27)	0.54(0.18-2.50)	1.55(0.96-2.51)	0.855
Frequently eat quickly	1.15(0.84-1.58)	1.34(0.93-1.93)	1.03(0.70-1.54)	1.35(0.81-2.27)	1.39(0.31-6.31)	1.51(0.79-2.88)	1.23(0.39-3.87)	1.24(0.78-1.96)	0.714
Fat consumption									
Eat fried food (almost every day)	1.05(0.72-1.54)	1.33(0.88-2.02)	0.80(0.48-1.34)	1.66(0.94-2.93)	0.72(0.09-6.11)	1.01(0.47-2.16)	3.17(0.99-10.02)	1.25(0.73-2.13)	0.942
Eat eggs (almost every day)	0.65(0.45-0.93)*	0.77(0.52-1.15)	0.64(0.41-0.99)*	0.68(0.38-1.21)	0.72(0.13-3.92)	0.874	0.94(0.29-3.03)	0.70(0.42-1.18)	0.468
Eat fatty meat (≥3 days/week)	0.81(0.58-1.13)	1.03(0.71-1.50)	0.81(0.53-1.24)	0.76(0.43-1.32)	1.38(0.30-6.33)	0.759	2.79(0.83-9.36)	0.88(0.54-1.42)	0.770
Eat seafood (<3 days/week)	1.16(0.84-1.60)	1.23(0.84-1.79)	1.09(0.73-1.63)	1.16(0.69-1.96)	2.17(0.41-11.34)	0.419	1.19(0.61-2.30)	1.28(0.80-2.06)	0.427
Salt consumption									
Frequently prefer strong flavors	1.64(1.17-2.28)**	0.71(0.46-1.11)	1.62(1.07-2.45)*	1.74(1.02-2.95)*	1.13(0.22-5.88)	0.974	1.04(0.28-3.87)	0.66(0.38-1.17)	0.673
Eat miso or other soup (≥2 times/day)	0.97(0.53-1.79)	1.01(0.51-2.01)	1.11(0.54-2.27)	0.88(0.31-2.48)	2.23(0.26-19.17)	0.726	0.96(0.12-7.58)	1.04(0.43-2.47)	0.589
Drink almost all noodle soup	1.05(0.67-1.65)	0.77(0.44-1.37)	0.85(0.47-1.57)	1.15(0.57-2.32)	3.95(0.86-18.03)	0.077	0.65(0.08-5.09)	0.92(0.47-1.78)	0.759
Eat salty foods (≥3 days/week)	0.59(0.30-1.16)	0.72(0.35-1.47)	0.60(0.26-1.41)	0.66(0.23-1.87)	1.41(0.17-12.02)	0.544	1.17(0.15-9.29)	0.64(0.25-1.62)	0.505
Add soy sauce to cooked meal	1.92(1.20-3.06)**	1.65(0.95-2.88)	1.82(1.01-3.28)*	2.14(1.05-4.36)*	1.84(0.22-15.62)	0.647	1.10(0.14-8.63)	2.06(1.09-3.90)*	0.457
Eat pickles (≥2 times/day)	1.71(0.99-2.97)	0.84(0.37-1.87)	1.41(0.68-2.93)	2.18(0.99-4.81)	2.15(0.25-18.48)	0.495	1.73(0.22-13.78)	0.55(0.17-1.79)	0.114
Nutritional balance									
Frequently skip breakfast	5.42(3.79-7.73)**	2.80(1.82-4.32)**	4.87(3.14-7.54)**	6.81(3.94-11.77)**	6.85(1.44-32.63)*	0.345	2.89(0.84-9.95)	2.89(1.68-4.99)**	0.880
Eat vegetables (<3 times/day)	1.14(0.81-1.62)	1.36(0.90-2.05)	1.18(0.76-1.83)	0.94(0.54-1.61)	3.01(0.36-25.19)	0.824	0.65(0.20-2.08)	1.62(0.94-2.78)	0.456
Eat fruit (<7 days/week)	2.62(1.71-3.88)**	1.34(0.90-1.98)	2.01(1.26-3.20)**	3.78(1.84-7.75)**	3.85(0.45-32.79)	0.096	1.99(0.93-4.26)	1.04(0.31-3.48)	0.329
Eat soy products (<7 days/week)	1.45(1.03-2.05)*	1.33(0.90-1.96)	1.21(0.79-1.84)	1.75(0.97-3.13)	3.71(0.44-30.98)	0.135	2.86(0.62-13.17)	1.34(0.82-2.18)	0.321
Eat milk products (<7 days/week)	1.46(1.06-2.01)*	1.33(0.92-1.92)	1.43(0.96-2.12)	1.50(0.89-2.50)	2.11(0.46-9.60)	0.832	1.43(0.75-2.72)	1.22(0.77-1.93)	0.468
Alcohol consumption									
Daily alcohol consumption (≥23 grams/day)	3.24(2.23-4.71)**	2.22(1.41-3.49)**	2.58(1.61-4.15)**	4.42(2.52-7.77)**	6.19(1.32-28.97)*	0.113	2.15(0.57-8.10)	2.35(1.32-4.20)**	0.937
Psychological health status									
Stressed	1.20(0.75-1.93)	0.79(0.42-1.47)	1.36(0.77-2.38)	0.67(0.26-1.71)	5.84(1.27-26.81)*	0.780	1.50(0.32-7.00)	0.77(0.34-1.71)	0.986
Depressed	1.85(0.97-3.52)	1.15(0.48-2.76)	1.80(0.79-4.12)	1.99(0.75-5.29)	3.58(0.41-31.49)	0.509	1.91(0.56-6.54)	0.58(0.14-2.48)	0.171
Global health status									
Poor current health	0.82(0.49-1.39)	1.41(0.83-2.39)	0.67(0.32-1.37)	0.77(0.34-1.77)	4.46(0.87-22.72)	0.145	2.28(1.02-5.10)*	1.00(0.48-2.09)	0.157
Sleep problems									
Sleeping time (<6 hours/day)	0.94(0.62-1.41)	1.07(0.67-1.70)	1.11(0.69-1.79)	0.84(0.44-1.60)	0.56(0.07-4.73)	0.271	0.77(0.33-1.77)	2.85(0.88-9.21)	0.460
Snoring	1.16(0.73-1.85)	1.64(0.95-2.83)	1.16(0.65-2.09)	1.08(0.51-2.26)	2.03(0.30-13.65)	0.708	1.52(0.60-3.87)	1.44(0.70-2.95)	0.947
Sleep apnea	1.25(0.40-3.95)	2.15(0.60-7.79)	1.14(0.25-5.11)	1.39(0.29-6.73)	4.59(0.42-50.32)	0.491	3.13(0.38-25.63)	6.90(0.73-65.71)	0.368

*p<0.05, **p<0.01, ***p<0.001.

Multivariable adjusted relative odds ratios (95% confidence interval) are shown.

Physical activity was adjusted for age, socioeconomic status, eating habits score, and alcohol consumption.

Eating habits were adjusted for age, socioeconomic status, regular physical activity, and alcohol consumption.

Alcohol consumption was adjusted for age, socioeconomic status, regular physical activity, and eating habits score.

Other variables were adjusted for age, socioeconomic status, regular physical activity, eating habits score, and alcohol consumption.

Global health status and sleeping time: Number of current smokers, ex-smokers and non-smokers were 138, 97 and 1,067, respectively.

Snoring: Number of current smokers, ex-smokers and non-smokers were 102, 69 and 778, respectively. Sleep apnea: Number of current smokers, ex-smokers and non-smokers were 94, 60 and 746, respectively.

The test for trend was calculated across increasing categories of daily cigarette consumption for current smokers only.

The test for trend was calculated across increasing categories of years after cessation for ex-smokers only.

The test for trend was calculated across increasing categories of years after cessation for ex-smokers and current smokers (duration was assumed to be 0).

Table 4 Standardized partial regression coefficients of multiple regression analysis for the duration of smoking cessation

	Males (N = 1,788)	Females (N = 235)
Amount of physical activity (MET-hours/week)	0.052 *	0.018
Undesirable eating habits score	-0.160 ***	-0.063
Alcohol consumption (grams/week)	-0.089 ***	-0.003
Stressed	-0.009	-0.068
Depressed	-0.004	-0.080
Poor global health status	0.038	0.031
Sleep problems	0.003	0.020
Age	0.260 ***	0.123
Socioeconomic status	-0.008	-0.047
R	0.359	0.196
R ²	0.129	0.038
Adjusted R ²	0.124	0.001
F-value (P-value)	29.208 (0.000)	0.999 (0.442)

*p<0.05, ***p<0.001.

Discussion

In this cross-sectional study, compared to non-smokers, current smoking was significantly related with undesirable eating habits and alcohol consumption in both genders, i.e., current smokers drank more sugar-sweetened beverages, preferred strong flavors, added soy sauce to cooked meals, and skipped breakfast. Moreover, they ate fruit, soy beans and milk products less frequently. Particularly in males, current smokers took less regular exercise/physical activity and had more sleep problems. In addition, the duration of smoking cessation in males was significantly related to a change in unhealthy lifestyle habits.

The reasons for the close relationship between smoking and multiple unhealthy lifestyle habits may be explained by overlapping

nicotine dependence, depressive symptoms and low health consciousness in current smokers¹⁴⁾. A previous study reported that lifestyle changes among ex-smokers seemed to be associated with increased health consciousness⁸⁾.

The coexistence of smoking and unhealthy lifestyle habits can be explained by the degree of nicotine dependence¹⁴⁾. We observed a dose-dependent relationship of the daily cigarettes smoked with undesirable behaviors, suggesting the importance of the degree of nicotine dependence. Current smokers presumably give first priority to smoking and, for that reason, they exercise less regularly and have low physical activity. We observed that current smokers skipped breakfast more frequently: one possible explanation is that current smokers prioritize the desire to smoke over having breakfast because of the low se-

rum nicotine concentration at the time of awakening due to overnight cessation of smoking during sleep.

In the present study, current smokers drank more alcohol in both genders. Pharmacologically, nicotine and ethanol have effects which partially counteract each other¹⁵. Cigarette smoking slows gastric emptying and, as a consequence, delays alcohol absorption¹⁶, which leads smokers to drink more.

We observed that current smokers ate snacks in both genders less frequently and ate until full in males less frequently, also suggesting that nicotine has a suppressive action on appetite. In regard to its effects on eating, nicotine is suggested to interact with neuropeptides and peptide hormone involved in the regulation of food intake and energy expenditure¹⁷, which may contribute to appetite suppression.

Cigarette smoking is known to influence dietary choices through such mechanisms as alterations in taste or olfaction¹⁸. The findings in the present study appear in accordance with their report that current smokers eat more meals with a high salt content and more often drink sugar-sweetened beverages. Furthermore, previous studies reported that smokers were less likely to consume vegetables, fruit and milk^{8,19}. We also observed these findings in males in the present study. These findings may be explained by cigarette smoking affecting the taste buds and reducing the palatability of vegetables²⁰.

In the present study, current smokers had more frequent sleep problems. Insufficient quality of sleep has been reported to be associated with smoking, physical inactivity, heavy alcohol drinking and obesity²¹. We

could not identify any confounding effect of obesity on the relationship between current smokers and snoring or sleep apnea (data not shown). On the other hand, we observed that current male smokers sleep significantly longer. Thus, smoking was independently related to sleep problems and prolongation of the sleep time may be due to a decrease in the quality of sleep.

In the present study, we could not find any significant relationship between current smoking and perceived stress and depressive symptoms by PRIME-MD in either gender. A previous study reported that nicotine dependence predisposed participants to depression or anxiety disorders²². On the other hand, other previous studies in Japanese reported that current smokers were not significantly related with depressive symptoms^{23,24}. A future study using a more detailed battery of tests to detect depression is needed.

We observed that the duration of smoking cessation was significantly related to a change in unhealthy lifestyle habits, such as an increase in physical activity, and a decrease in undesirable eating habits and alcohol consumption in male ex-smokers. The beneficial changes among ex-smokers may have derived from the reduced effect of nicotine after smoking cessation and the resultant increase of health awareness. We observed that ex-smokers had a significantly higher stage of readiness to change their lifestyle habits than current smokers in males (data not shown).

However, male ex-smokers who had quit for more than 5 years were still significantly found to have some undesirable eating habits, drink alcohol more often and have sleep problems. In male ex-smokers who were previ-

ously light smokers, 1–10 cigarettes per day, the duration of smoking cessation was significantly inversely related with salt consumption items; however, for those who were previously moderate-to-heavy smokers, the duration of smoking cessation was not significantly related with any of the above items (data not shown). Thus, the unhealthy behaviors among male ex-smokers with higher nicotine dependence appeared to last longer than expected after smoking cessation.

The strength of our study was that we showed a consistent relationship of the cigarette smoking status with unhealthy lifestyle habits, independent of age, socioeconomic status, and several lifestyle factors, as well as a dose-dependent relationship of daily cigarettes smoked with a clustering of undesirable behaviors. These results strongly suggest that cigarette smoking is a cornerstone for the accumulation of unhealthy lifestyle habits. Furthermore, we found that the duration of smoking cessation in males appeared to be significantly related to a change in unhealthy lifestyle habits. Thus, from a health promotion perspective, smoking cessation is most likely to be a gateway to alleviate other unhealthy lifestyles.

The study does, however, have several limitations. First, cross-sectional observations cannot provide any evidence of causal associations. Second, we used a health questionnaire to assess eating habits qualitatively; therefore, we were unable to obtain information on quantitatively assessed food items. Third, we must acknowledge the possibility of recall bias, particularly concerning the duration of smoking cessation and the number of cigarettes smoked by ex-smokers. Additionally,

we asked the ex-smokers about their age when they started to smoke and stopped smoking but not the exact date when they stopped smoking. There were few female current/ex-smokers; therefore, the analysis results may not be sufficiently reliable, as suggested by the very wide 95% confidence intervals. A smoking habit is reported to be related with social class⁷⁾, education and marital status²⁵⁾, but we did not assess these variables in the present study. A prospective cohort study is therefore needed to delineate more precisely the causal relationship of the cigarette smoking status with lifestyle habits.

Conclusion

This cross-sectional analysis indicated that current smokers were significantly related with multiple unhealthy lifestyle habits in both genders of Japanese employees as compared with nonsmokers. In addition, the duration of smoking cessation in males was significantly related to a change in unhealthy lifestyle habits; however, these causal relationships need to be confirmed in prospective studies.

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日本人勤労者における喫煙状況と不健康な生活習慣との関連

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目的：日本人勤労者において喫煙状況と不健康な生活習慣との関連性について検討することを目的とした。

方法：男性 4009 名および女性 1620 名を対象に質問紙を用いて横断調査を行った。喫煙状況と各習慣との関連は、交絡因子を調整した多重ロジスティック回帰分析を行った。禁煙年数と喫煙以外の習慣との関連については重回帰分析を行った。

結果：男女ともに現在喫煙者は非喫煙者に比べて、有意に砂糖入り飲料をとる（調整オッズ比、以下 OR：男性 2.01、女性 1.93）、味付けが濃い（OR：男性 2.23、女性 1.64）、醤油・ソースをかける（OR：男性 3.02、女性 1.92）、朝食欠食（OR：男性 2.54、女性 5.42）、多量飲酒（OR：男性 2.28、女性 3.24）であった。また間食・夜食が少ない、果物、大豆製品、乳製品が少ないことが示された。男性喫煙者は非喫煙者に比べて、有意に運動・身体活動が少なく、睡眠障害が多くみられた。男性において、禁煙年数と身体活動との有意な正の関連（ $\beta=0.052$ 、 $P<0.01$ ）、食習慣の偏り（ $\beta=-0.160$ 、 $P<0.01$ ）と飲酒量との有意な負の関連が認められた（ $\beta=-0.089$ 、 $P<0.01$ 、調整済み $R^2=0.124$ ）。

結論：男女ともに現在喫煙者は非喫煙者に比べて、不健康な生活習慣を有することが示された。男性では禁煙年数と不健康な生活習慣変容との有意な関連を認めた。

キーワード：喫煙、生活習慣、横断研究、勤労者、日本

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