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Correlation between radiographic knee osteoarthritis and cigarette smoking in a Korean population

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Objectives

Although cigarette smoking has been known as a risk factor for degenerative arthritis, recent studies showed a negative correlation between smoking and degenerative arthritis. This study aimed to investigate the correlation of knee radiographic osteoarthritis (ROA) according to smoking amount in general population.

Materials and Methods

This cross-sectional study used public data from the Fifth and Sixth Korean National Health and Nutrition Examination Survey (2010 to 2013). Subjects included 11,638 community-dwelling adults aged ≥50 years. Knee ROA were defined as a Kellgren/Lawrence grade ≥2 on the plain radiographic study. The lifetime cigarette smoking amount was calculated as quartiles in terms of pack-year. Independent correlation of smoking on knee ROA was determined using odds ratios (OR) adjusted for age group, sex, obesity, physical activity, and household income on multivariate logistic regression analysis.

Results

Prevalence of knee ROA was 37.3% and lifetime cigarette smokers was 24.0% of the target population. Subjects with knee ROA had higher mean age, female sex ratio, and body mass index in contrast with lower physical activity (Table 1). The adjusted logistic regression model revealed that female sex (OR 2.110, 95% CI 1.895-2.349) was significantly associated knee ROA. Older age, obesity and lower household income showed positive correlations with knee ROA. Second and fourth quartile of smoker had the lower prevalence of ROA compared to never-smoker (OR 0.800, 95% CI 0.643-0.994 and OR 0.812, 95% CI 0.684-0.965) (Table 2).

Conclusion

Negative correlation with knee ROA was confirmed only in moderate to high smokers. Prospective studies will be needed to reveal the effect of smoking on knee ROA.

Table 1. Characteristics of subjects by radiographic knee osteoarthritis

		Control (n = 7294)	Radiographic knee OA (n = 4344)	P-value*
Age (years)		61.52 ± 8.60	68.36 ± 8.81	<0.001
Sex (Female %)		50.2%	69.4%	<0.001[†]
Region (Urban %)		76.5%	67.2	0.001[†]
BMI (kg/m^2)		23.62 ± 2.95	24.66 ± 3.33	<0.001
Waist circumference (cm)		82.41 ± 8.93	84.71 ± 9.28	<0.001
Obesity (%)	Low (BMI < 18.5)	3.3	1.89	<0.001[†]
	Normal (BMI 18.5-22.9)	38.73	28.89	
	Overweight (BMI 23-24.9)	27.73	25.19	
	Obese I (BMI 25-29.9)	28.15	38.07	
	Obese II (BMI ≥ 30)	2.13	5.96	
Household income (%)	1Q (Low)	24.75	44.07	<0.001[†]
	2Q (Mid-low)	26.38	24.92	
	3Q (Mid-high)	22.63	16.96	
	4Q (High)	26.25	14.04	
Physical activity (METs/week)		2121.93 ± 3336.29	1848.29 ± 3380.78	<0.001
Physical activity	1Q (Low)	25.61	33.35	<0.001[†]
_quartile (%)	2Q (Mid-low)	23.79	24.68	
	3Q (Mid-high)	24.46	20.20	
	4Q (High)	26.14	21.77	
Cigarette smoking	Never smoker	74.02	81.94	<0.001[†]
(%)	1Q (Low)	3.71	3.59	
	2Q (Mid-low)	5.45	3.42	
	3Q (Mid-high)	7.62	4.53	
	4Q (High)	9.20	6.51	

OA, osteoarthritis; BMI, body mass index; METs, metabolic equivalents

P value by *independent T-test and [†]Chi-square test.

Table 2. Odds Ratios of radiographic knee osteoarthritis

	N	Unadjusted OR[*] (95% CI)	*P*-value	Adjusted OR[†] (95% CI)	*P*-value
Sex					
Male	4946	1.000		1.000	
Female	6692	2.249 (2.083-2.428)	<0.001	2.110 (1.895-2.349)	<0.001
Age					
50-59	4326	1.000		1.000	
60-69	3802	2.763 (2.504-3.047)	<0.001	2.750 (2.469-3.063)	<0.001
70-79	2885	5.616 (5.065-6.227)	<0.001	5.844 (5.171-6.605)	<0.001
≥80	625	9.886 (8.304-11.769)	<0.001	11.685 (9.501-14.371)	<0.001
Obesity				-	
Low	314	1.000		1.000	
Normal	4044	1.288 (1.001-1.656)	0.049	2.198 (1.650-2.929)	<0.001
Overweight	3126	1.568 (1.217-2.020)	0.001	3.230 (2.415-4.320)	<0.001
Obese I	3742	2.335 (1.816-3.001)	<0.001	4.921 (3.684-6.572)	<0.001
Obese II	412	4.838 (3.545-6.602)	<0.001	9.637 (6.747-13.766)	<0.001
Physical activity					
1Q (Low)	3310	1.000		1.000	
2Q (Mid-low)	2809	0.797 (0.719-0.882)	<0.001	0.932 (0.831-1.046)	0.231
3Q (Mid-high)	2660	0.634 (0.571-0.705)	<0.001	0.849 (0.753-0.956)	0.007
4Q (High)	2859	0.640 (0.577-0.709)	<0.001	1.044 (0.928-1.175)	0.473
Household income					
1Q (Low)	3677	1.000		1.000	
2Q (Mid-low)	2999	0.531 (0.482-0.584)	<0.001	0.799 (0.715-0.892)	<0.001
3Q (Mid-high)	2407	0.421 (0.379-0.468)	<0.001	0.791 (0.699-0.895)	<0.001
4Q (High)	2555	0.300 (0.269-0.335)	<0.001	0.653 (0.574-0.742)	<0.001
Cigarette smoking					
Never smoker	8846	1.000		1.000	
1Q (Low)	449	0.875 (0.719-1.064)	0.179	1.035 (0827-1.294)	0.764
2Q (Mid-low)	569	0.566 (0.470-0.683)	<0.001	0.800 (0.643-0.994)	0.044
3Q (Mid-high)	780	0.537 (0.457-0.632)	<0.001	0.835 (0.688-1.013)	0.068
4Q (High)	994	0.640 (0.556-0.736)	<0.001	0.812 (0.684-0.965)	0.018

OR, odds ratito; CI, confidence interval

*Unadjusted odds ratios by logistic regression analysis.

†Adjusted odds ratios by multivariate logistic regression analysis; adjusted for all other variables