

Association between Arteriolar Sclerotic and Hypertensive Changes in Retina and Cardiovascular Disease Risk Factors among Japanese Urban Workers and Their Families

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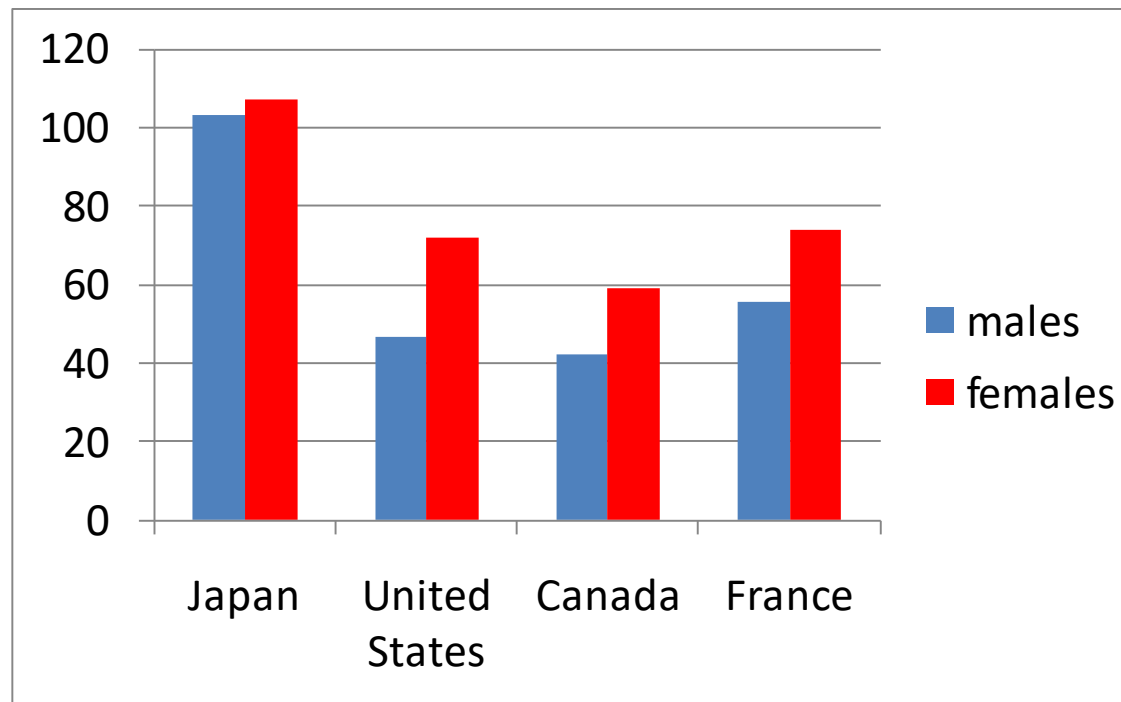
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BACKGROUND

Having a high mortality of stroke, Japanese citizens has been encouraged to take annual cardiovascular medical checkup including ophthalmoscopy since 1960s.

Fig1. Mortality of Stroke Among Countries

Stroke
Mortality
(per
100,000perso
nyear)



OBJECTIVE

The purpose of the study is to examine the association of arteriolar sclerotic and hypertensive (ASH) changes in retinal arteries with cardiovascular disease (CVD) risk factors.

METHODS(1)

Subjects

Subjects were 7,272 employees and families (4,431 men and 2,841 women) recruited from those who participated in CVD screening in major cities in Japan for 2006-2007.

METHODS(2)

Measurements of CAVI

- Measurement of CAVI, a stiffness indicator of arteries is measured by VaSera VS-1000 manufactured by Fukuda-Denshi Company (Tokyo, Japan).
- The average CAVI score of healthy people was used as threshold, and abnormally high CAVI scores were determined as those exceeding (mean score + standard deviation) of the age-specific healthy group. All CAVI scores were converted to the binary variable.

METHODS(3)

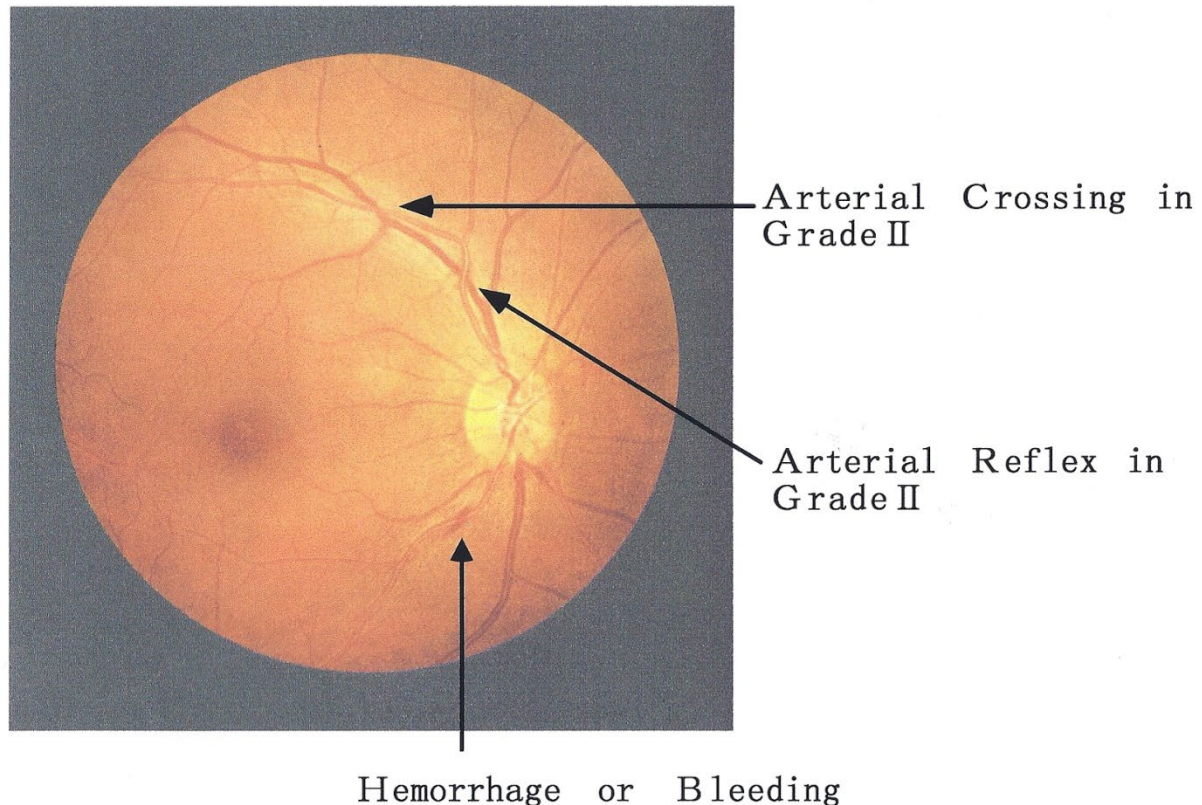
- Blood was drawn from the subjects after 12 hour-fasting.
- The criterion for defining diabetes;
 ≥ 126 mg/dl of fasting plasma glucose concentration
- The criterion for hypertension:
 SBP ≥ 160 mmHg and/or DBP ≥ 100 mmHg.
- Self-administered questionnaires on lifestyle were filled out by subjects at the time of screening.

METHODS(4)

- Retinal photographs of the right eye were taken by non-mydratic retinal camera (Canon Co., Tokyo, Japan) to identify subjects with abnormal changes in retinal arteries by using Scheie's classification method.
- ASH changes in retinal arteries were transformed to the binary table: 0 for score 0 as normal and 1 for scores I –IV as abnormal.

Fig 2 Example of ASH changes using Scheie's classification method

Hemorrhage (bleeding) in The Retina



METHODS(5)

Statistical Method

Multiple logistic regression analysis was conducted using ASH changes in retinal arteries as a dependent variable and CVD risk factors as covariates.

SPSS vs.16 was used for statistical analysis.

RESULTS(1)

Age

*p<0.05
**p<0.01
***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
20-39 (reference)	33	1.00		39	1.00	
40-59	56	2.30 (1.61-3.29)	***	55	10.09 (2.80-36.31)	***
≥60	11	7.70 (5.07-11.69)	***	6	49.41 (12.43-194.27)	***

RESULTS(2)

BMI

*p<0.05
 **p<0.01
 ***p<0.001

Risk factors	Males			Females		
	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
≤19.9	10	1.03 (0.62-1.73)		38	0.58 (0.24-1.44)	
20-22.9	33	0.82 (0.58-1.14)		38	0.98 (0.46-2.09)	
23-24.9 (reference)	26	1.00		13	1.00	
25-26.9	17	1.30 (0.91-1.84)		6	1.34 (0.50-3.62)	
≥27	14	1.53 (1.05-2.23)	*	5	1.39 (0.51-3.78)	

RESULTS(3)

Hypertension

*p<0.05
**p<0.01
***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
No (reference)	94	1.00		98	1.00	
Yes	6	17.10 (12.97-22.54)	***	2	28.52 (15.02-54.17)	***

RESULTS(4)

Hyperglycemia

*p<0.05
**p<0.01
***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
No (reference)	96	1.00		99	1.00	
Yes	4	6.59 (4.80-9.06)	***	1	33.95 (12.78-90.15)	***

RESULTS(5)

HDL

*p<0.05
**p<0.01
***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
<40 (reference)	7	1.00		1	1.00	
40-59	47	0.38 (0.25-0.56)	***	17	0.29 (0.07-1.26)	
≥60	46	0.40 (0.26-0.61)	***	82	0.30 (0.08-1.20)	

RESULTS(6)

CAVI

*p<0.05
**p<0.01
***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
Normal (reference)	81	1.00		80	1.00	
High	19	1.88 (1.44-2.47)	***	20	2.49 (1.42-4.39)	**

RESULTS(7)

Drinking

*p<0.05
**p<0.01
***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
none (reference)	23	1.00		57	1.00	
Current drinkers	77	0.95 (0.71-1.27)		43	0.89 (0.50-1.59)	

RESULTS(8)

Smoking

*p<0.05
 **p<0.01
 ***p<0.001

	Males			Females		
Risk factors	% in all subjects	ORs (95%CI)	p-value	% in all subjects	ORs (95%CI)	p-value
none (reference)	29	1.00		75	1.00	
ex-smokers	26	1.15 (0.85-1.56)		9	1.04 (0.32-3.38)	
smokers	45	0.68 (0.50-0.92)	**	16	2.34 (1.13-4.81)	*

DISCUSSION(1)

- **Our study shows the strong association between ASH changes in retinal arteries and some cardiovascular risk factors such as hypertension, hyperglycemia and arterial stiffness in major arteries predicted by Cardio Ankle Vascular Index (CAVI).**

DISCUSSION(2)

- **There was a strong association between age (40years and older) and ASH changes in retinal arteries.**

DISCUSSION(3)

- **As for dyslipidemia, we saw the negative associations between HDL-cholesterol and ASH changes in retinal arteries in males. Although we could not reach the statistical significance in females, this is probably due to the small number of female dyslipidemia subjects (24people).**

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DISCUSSION(4)

- **There was a positive association for obese (BMI>27) and ASH changes in retinal arteries independent of hypertension in males.**

DISCUSSION(5)

Regarding to the association between smoking and ASH changes in retinal arteries, we saw the different pattern between genders. Compared to the male current smokers who had negative association between ASH changes in retinal arteries, female current smokers had statistically significant high odds ratios. We can at least say that this might imply the characteristic difference between gender among Japanese smoking population.

DISCUSSION(6)

- **We saw no statistically significant association between drinking and ASH changes in retinal arteries.**

Thank you.



North Cascade in Washington



Mt. Fuji in Japan