Sasang constitutional types can act as a risk factor for insulin resistance

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Background

This study explores the correlation of Sasang constitution and insulin resistance by examining the distribution of insulin resistance across different constitutional types and investigating the contribution of constitutional types to the incidence of insulin resistance.

Method

21–80, with complete medical data and confirmed constitutional typing, were included in the final subject group (n = 1535). In order to ensure greater precision in Sasang constitutional typing, only those who showed matching constitutional types in the revised Questionnaire for the Sasang Constitution Classification II.

IR was assessed by three measures of insulin sensitivity: fasting serum insulin (mU/mL), the homeostasis model assessment for insulin resistance (HOMA-IR), and the quantitative insulin sensitivity check index (QUICKI). The criteria for hypertension were based on JNC-7. Dyslipidemia was defined according to NCEP-ATP III. The body mass index (BMI) cutoff points for determining overweight/obesity were taken from the WHO recommendation for the Asian-Pacific populations, and the waist circumference (WC) cutoff points for central obesity were adopted from the 'Korean Society for the Study of Obesity'.

Differences in the markers of IR across different Sasang constitution types were compared in the ANOVA test (Scheffe's post hoc analysis). Multiple logistic regression analysis was used to estimate the odds ratio for being placed in the highest quartile of fasting insulin and HOMA-IR and the lowest quartile of QUICKI across different Sasang constitutional types.

Result

Defining insulin resistance as being included in the highest quartile of fasting insulin (≥10.50 μU/mL) and HOMA (≥2.39) distribution and the lowest quartile of QUICKI (≥0.33) distribution, the prevalence of insulin resistance was highest in the TE type (34.97-37.88%). Compared to other constitutional types, the TE type had a higher odds ratio for insulin resistance even after adjusting for age, sex and BMI/WC. Among various independent variables, the odds ratio for insulin resistance of the TE constitutional type was significantly high (1.47 (1.11-1.96)), indicating that the TE type can indeed act as a risk factor for insulin resistance.

Discussion

This study shows that the constitutional type of an individual is a trait that can act as an independent risk factor for insulin resistance.

Table 1 – General characteristics of the participants.

	Men (n = 763)	Women (n = 772)	Total (n = 1535)
Age (years)	47.06 ± 11.16	47.15 ± 11.36	47.10 ± 11.25
Height (cm)*	168.78 ± 6.99	158.61 ± 7.05	163.67 ± 8.66
Weight (kg)*	69.68 ± 10.36	59.30 ± 9.34	64.46 ± 11.14
Body mass index (kg/m^2)*	24.40 ± 2.92	23.56 ± 3.19	23.98 ± 3.09
Waist circumference (cm)*	85.24 ± 8.60	80.39 ± 9.11	82.80 ± 9.18
Systolic blood pressure (mm Hg)*	124.77 ± 14.35	120.04 ± 14.14	122.39 ± 14.44
Diastolic blood pressure (mm Hg)*	73.34 ± 9.89	71.32 ± 9.60	72.33 ± 9.80
Total cholesterol (mg/dL)	197.00 ± 34.71	194.49 ± 35.01	195.74 ± 34.87
Triglyceride (mg/dL)*	137.84 ± 80.17	107.70 ± 65.63	122.68 ± 74.73
LDL-cholesterol (mg/dL)	49.53 ± 12.02	55.30 ± 13.70	52.44 ± 13.20
HDL-cholesterol (mg/dL)*	121.08 ± 32.06	117.96 ± 32.11	119.51 ± 32.11
Fasting glucose (mg/dL)*	91.45 ± 10.91	89.40 ± 10.43	90.41 ± 10.72
Insulin (μU/mL)	8.21 ± 4.63	8.60 ± 5.65	8.40 ± 5.17
HbA1c (%)	5.39 ± 0.44	5.39 ± 0.57	5.39 ± 0.51
HOMA	1.87 ± 1.14	1.93 ± 1.41	1.90 ± 1.29
QUICKI	0.36 ± 0.05	0.36 ± 0.04	0.36 ± 0.04
Hypertension†	236 (30.93)	155 (20.08)	391 (25.47)
Dyslipidemia†	318 (41.68)	227 (29.40)	545 (35.50)
Past and current smoking†	506 (66.32)	55 (7.12)	561 (36.55)
Sasang constitutional type†			
SE type	77 (10.09)	223 (28.89)	300 (19.54)
SY type	299 (39.19)	181 (23.45)	480 (31.27)
TE type	387 (50.72)	368 (47.67)	755 (49.19)

* $p < 0.05$ by independent sample t-test.
† $p < 0.05$ by chi-square test.

Table 2 – The prevalence of insulin resistance and relevant clinical parameters for different Sasang constitutional types.

	Sasang constitutional type, N (%)		
	SE type (n = 300)	SY type (n = 480)	TE type (n = 755)
Current or past smoking*	54 (18.0)	221 (46.0)	286 (37.9)
Hypertension*	35 (11.7)	124 (25.8)	232 (30.7)
Dyslipidemia*	59 (19.7)	156 (32.5)	330 (43.7)
Body mass index*			
Underweight (–18.4)	23 (7.7)	10 (2.1)	5 (0.7)
Normal (18.5–22.9)	188 (62.7)	216 (45.0)	144 (19.1)
Overweight (23.0–24.9)	53 (17.7)	154 (32.1)	203 (26.9)
Obesity (25.0–)	36 (12.0)	100 (20.8)	403 (53.4)
Waist circumference*			
Normal	259 (86.3)	386 (80.4)	424 (56.2)
Abnormal	41 (13.7)	94 (19.6)	331 (43.8)
Fasting insulin* (highest quartile, ≥10.50 μU/mL)	50 (16.7)	89 (18.5)	286 (37.9)
HOMA-IR* (highest quartile, ≥2.39)	38 (12.7)	78 (16.3)	267 (35.4)
QUICKI* (lowest quartile, ≤0.33)	37 (12.3)	78 (16.3)	264 (40.0)

* $p < 0.05$ significantly different across the three Sasang constitutional types by chi-square test.

Table 3 – Multivariate logistic regression analysis of the risk factors of insulin resistance.

Dependent variable	Variables included in the final model	p-Value	Odds ratio[a] (95% confidence interval)
HOMA-IR (≥2.39)			
	Female	0.007	1.451 (1.108–1.900)
	Age	0.044	0.987 (0.974–1.000)
	TE type (vs. non-TE type)	0.007	1.485 (1.116–1.976)
	BMI	0.000	1.345 (1.275–1.418)
	Dyslipidemia	0.001	1.637 (1.209–2.217)
	Hypertension	0.000	2.032 (1.549–2.664)
Fasting Insulin (≥10.50 μU/mL)			
	Female	0.009	1.408 (1.089–1.820)
	Age	0.000	0.974 (0.962–0.986)
	TE type (vs. non-TE type)	0.009	1.434 (1.094–1.881)
	BMI	0.000	1.298 (1.235–1.365)
	Dyslipidemia	0.003	1.573 (1.172–2.113)
	Hypertension	0.000	1.958 (1.507–2.544)
QUICKI (≤0.33)			
	Female	0.007	1.453 (1.109–1.904)
	Age	0.021	0.985 (0.972–0.998)
	TE type (vs. non-TE type)	0.009	1.465 (1.099–1.952)
	BMI	0.000	1.351 (1.280–1.425)
	Dyslipidemia	0.002	1.604 (1.183–2.175)
	Hypertension	0.000	2.004 (1.527–2.631)

[a] The odds ratios, representing the odds of having insulin resistance vs. control, were calculated in the multivariate logistic regression analysis (backward stepwise method), involving the variables of sex, age, BMI, waist circumference, smoking history, hypertension, dyslipidemia, and the TE constitutional type.

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