Is reduced heart rate variability associated with arterial stiffness in youth with childhood-onset type 1 diabetes mellitus?

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OBJECTIVES

Increased arterial stiffness may precede cardiovascular complications in patients with type 1 diabetes (T1DM)(1).

As the autonomic nervous system is responsible for regulating heart rate and vascular tone, autonomic dysfunction may contribute to increased arterial stiffness in patients with T1DM.

We investigated whether decreased heart rate variability (HRV) was associated arterial stiffness index (ASI) in patients with childhood-onset T1DM without chronic complication.

METHODS

Subjects

77 T1DM patients (55 male, 58 female)

followed up at SNUCH (January, 2014 –June, 2015)

Inclusion criteria

10–29 years of age

disease duration ≥ 2years

Exclusion criteria

Underlying heart disease, thyroid dysfunction

Medications (anticonvulsants, anti-hypertensive, lipid-lowering agents)

Estimates of overall HRV

-Standard deviation of mean NN intervals (SDNN)

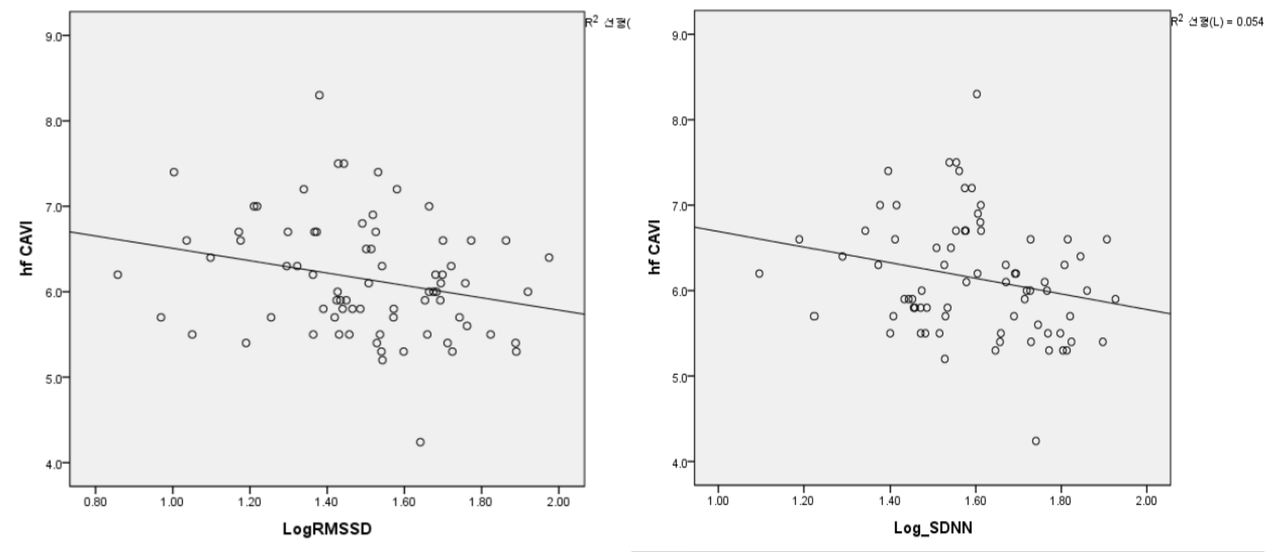
-Root mean squared difference of successive NN intervals (RMSSD)

Cardio-ankle vascular index (CAVI)

RESULTS

	mean (SD)	range
Age (years)	19.30±4.30	10.1, 28.1
Duration of diabetes (years)	10.57±4.07	2.0, 25.0
HbA1c (%)	7.90±1.29	5.5, 11.5
BMI (kg/m2)	21.22±3.07	15.48, 31.50
Cholesterol	185.49±34.51	107, 284
LDL-c(mmol/L)	96.52±26.71	16, 172
HDL-c(mmol/L)	69.79±17.67	40, 124
SBP	118.04±13.57	90, 155
DBP	70.96±7.01	58, 92
SDNN* (ms)	42.46±16.19	12.47, 84.46
RMSSD* (ms)	36.01±18.13	7.2, 94.36
CAVI*	5.77±0.98	4.2, 9.1

* log transformation



CAVI correlated negatively with both SDNN (*P*=0.044) and RMSSD (*P*=0.032) and positively with age (*P*<0.001) and cholesterol (*P*=0.019).

In multivariate analysis adjusting for demographic characteristics and traditional cardiovascular disease risk factors (age, sex, DBP, cholesterol, smoking, BMI z-score, diabetes duration, HbA1c), RMSSD were negatively correlated with CAVI (β=-0.049, *P*= 0.024).

CONCLUSIONS

Reduced HRV, especially decreased RMSSD was independently associated with increased arterial stiffness in patients with T1DM. Early testing and treatment for cardiac autonomic neuropathy may be effective in preventing cardiovascular morbidity and mortality.

References

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