

Impact of Glycemic Control;disease Duration;and Exercise on Heart Rate Variability in Children with type 1 Diabetes Mellitus

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Chen SR;Lee YJ;Chiu HW;Jeng C

Abstract

Background/Purpose

Type 1 diabetes is commonly associated with autonomic neuropathy. The present study investigated the influences of glycemic control, disease duration (DD), and exercise on autonomic nervous function in children with type 1 diabetes by analysis of their heart rate variability (HRV).

Methods

Seventy-nine type 1 diabetic children were recruited and categorized into four groups by HbA1c of 8% and DD of 4.5 years. HRV parameters as determined by separate frequency domain components (low frequency: LnLF, 0.04–0.15 Hz; high frequency: LnHF, 0.15–0.5 Hz; total power: LnTP, 0.04–0.5 Hz) were measured both at rest and during exercise. Pearson's correlation, one-way ANOVA, and multiple regressions with stepwise method were used for statistical analysis.

Results

While at rest, HbA1c and DD were negatively correlated with all HRV parameters. Both HbA1c and DD were significant predictors in LnTP. However, only HbA1c was a significant predictor in LnLF and LnHF. Type 1 diabetes patients with HbA1c > 8% and DD > 4.5 years had a significantly lower HRV than the other patients. During exercise, HRV reduced significantly and no significant correlation between HbA1c and HRV or between DD and HRV was observed. Also, a significant difference in HRV among the four groups was not demonstrated. The smallest decrement in HRV from resting to exercise were in subjects with HbA1c > 8% and DD > 4.5 years.

Conclusion

HbA1c was a more dominant predictor for LnTP, LnHF and LnLF than DD in children with type 1 diabetes at rest. HRV reduced significantly from resting to exercise. However, the responses of HRV during exercise differ from the responses of HRV at rest.

Key Words: disease duration; exercise; HbA1c; heart rate variability; type 1 diabetes