

The effect of high intensity interval training on cardiac autonomic regulation in patients with type 2 diabetes

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1. Introduction

- Type 2 Diabetes (T2D) is associated with reduced cardiac autonomic regulation and increased risk for cardiovascular morbidity and mortality (1, 2).
- Dysregulation in cardiac autonomic function is associated with increased mortality and morbidity (3).
- High intensity interval training (HIIT) has been shown to improve cardiac structure and function (4).
- The effects of HIIT on cardiac autonomic function in patients with T2D is unknown.

2. Aims

- Assess the relationship between glycaemic control and autonomic regulation.
- Define the effect of high intensity interval training on metabolic and autonomic regulation in patients with T2D.

3. Methods

- Twenty-two patients with T2D underwent cardiac autonomic function assessment including heart rate variability (HRV, R-R interval, Standard Deviation of N-N interval, low- and high-frequency spectral analysis), blood pressure variability (BPV), and baroreflex receptor sensitivity (BRS).
- Blood samples were taken to assess glycaemic control (HbA1c). Following baseline assessments, patients were randomised into 2 groups. Either HIIT (i.e. cycling on the stationary bike 3 times per week) or a standard care control group.
- Measurements of cardiac autonomic function and glycaemic control were repeated following 12 weeks in both groups.

4. Results

Table 1: Baseline characteristics of patients; control and HIIT group were similar for their baseline characteristics

Characteristic	Control	HIIT	p-value
N (male/female)	11 (8/3)	11 (9/2)	N/A
Age (years)	59±3	60±3	0.87
Time since diagnosis (years)	5±1	4±1	0.28
Height (cm)	169±3	171±2	0.77
Weight (kg)	91±3	91±5	0.96
BMI (kg/m ²)	32±2	31±2	0.75
Body surface area	2.01±0.03	2.02±0.05	0.94
Hba1c (%)	7.2±0.2	7.1±0.3	0.88
Hba1c (mmol/mol)	55±2	54±3	0.88
VO _{2max} (ml.Kg ⁻¹ .Min ⁻¹)	20±2	22±2	0.57
Medication use:			
Metformin (%)	7 (64)	7 (64)	N/A
Statins (%)	6 (55)	7 (64)	N/A
Blood pressure (%)	5 (45)	3 (27)	N/A

Figure 1: Increased HbA1c levels were associated with decreased baroreflex receptor sensitivity (n=22, r_s= -0.592, p= 0.004); there was no significant association between HbA1c to other measures of HRV or BPV (p>0.05)

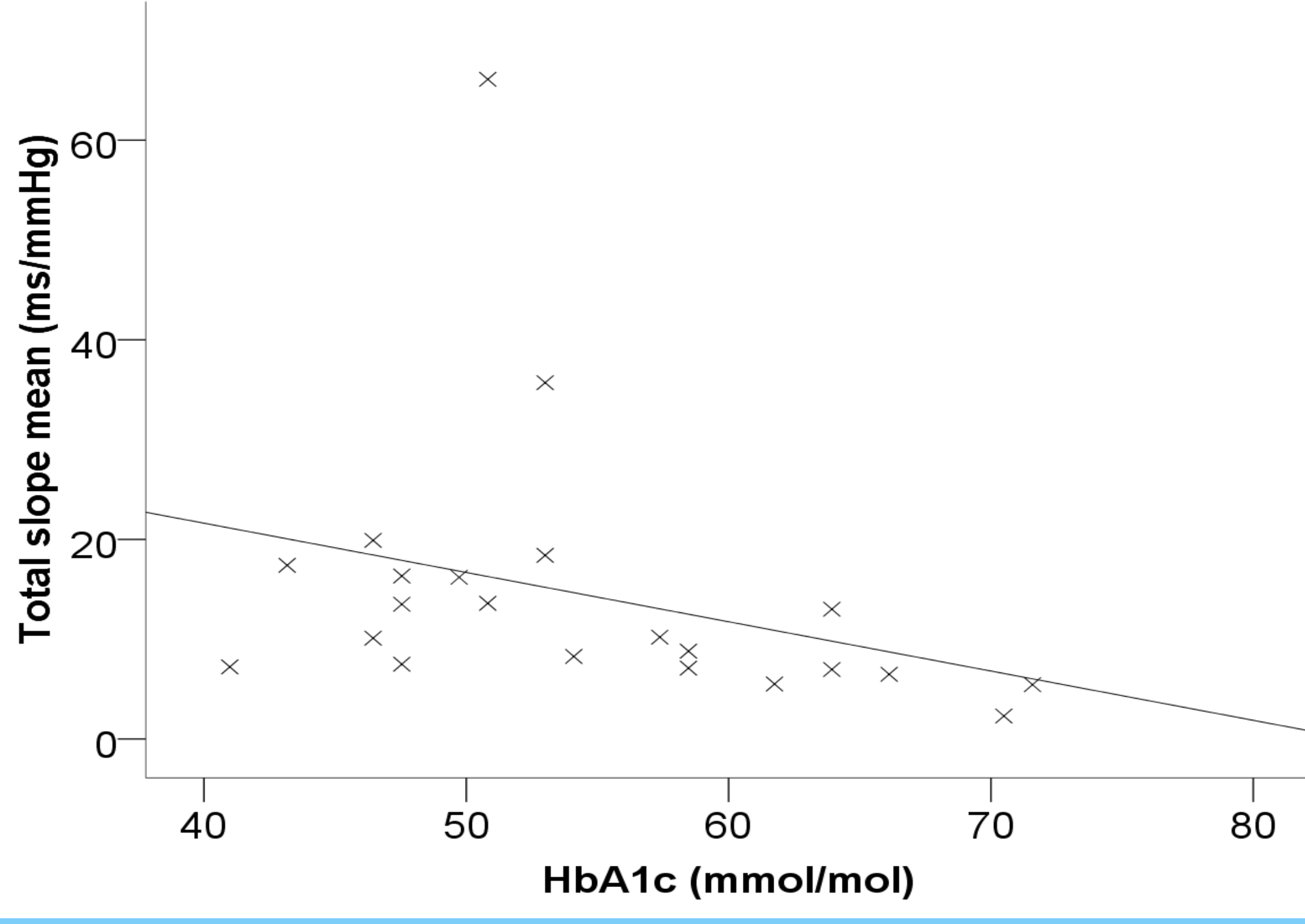


Figure 2: There was a significant difference in the change in HbA1c (p<0.05) following 12 weeks of HIIT compared to controls

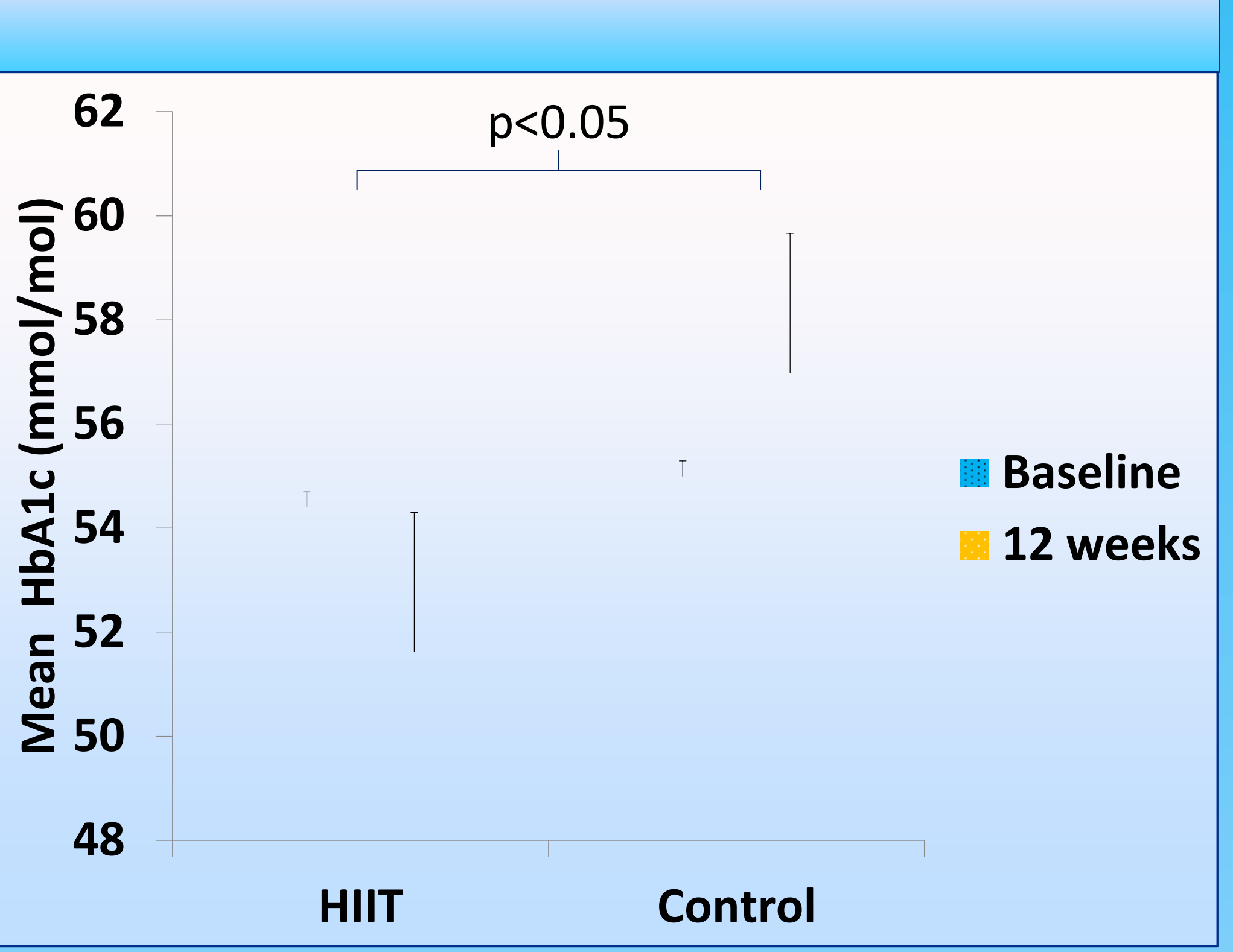
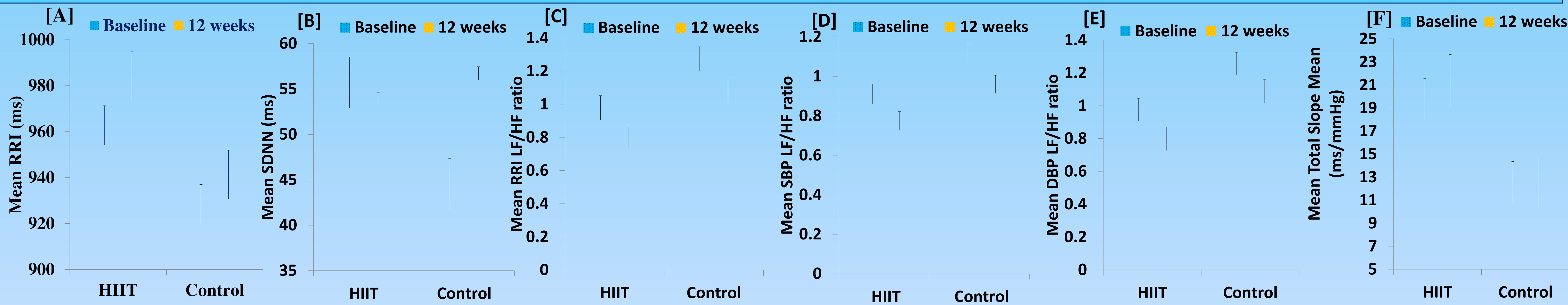


Figure 3: Following HIIT there were no significant changes from baseline in HRV (p>0.05), BPV (p>0.05) and BRS (p=0.09). No significant changes were found in the controls for HRV, BPV and BRS (All p-values>0.05)



5. Conclusions

- Patients with type 2 diabetes with poorer glycaemic control demonstrate decreased baroreflex receptor sensitivity.
- High intensity interval training improves glycaemic control in patients with Type 2 diabetes.
- High intensity interval training has a limited effect on cardiac autonomic regulation in patients with Type 2 diabetes.

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