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The effect of dapagliflozin on sympathetic nervous system activity in patients with diabetic and non-diabetic chronic kidney disease

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INTRODUCTION

Recent clinical trials – most notably Dapagliflozin And Prevention of Adverse Outcomes in Chronic Kidney Disease - DAPA-CKD and EMPA-REG OUTCOME – have shown that sodium-glucose co-transporter type 2 (SGLT2) inhibitors are highly beneficial in patients with chronic kidney disease with and without diabetes.

SGLT2 inhibitors slow the progression of chronic kidney disease and reduce the rate of renal and cardiovascular adverse events (1,2). The exact mechanisms of this nephroprotection are still being examined.

However, there is growing evidence that SGLT-2 inhibitors also affect the activity of sympathetic nervous system (SNS), which could be yet another important pathway of their cardioprotective and nephroprotective action (3,4).

AIM AND RESEARCH HYPOTHESIS

In our study, we aim to assess the effect of dapagliflozin on sympathetic nervous system activity in patients with diabetic and non-diabetic chronic kidney disease.

We established the following hypotheses:

- Dapagliflozin decreases sympathetic nervous system activity in patients with diabetic and non-diabetic chronic kidney disease.

- Dapagliflozin decreases sympathetic nervous system activity in patients with diabetic kidney disease to a greater extent compared to patients with non-diabetic chronic kidney disease.

MATERIALS AND METHODS

It is a non-interventional, observational, longitudinal study, single-centered study. Patients recruited into study are divided into two groups: patients with diabetic chronic kidney disease and patients with non-diabetic chronic kidney disease. There is no control group.

Patients are recruited to the study before receiving the first dose of dapagliflozin and undergo repeated procedures (Tab 1.) during three visits (Fig 1.).

One of the important parameters of SNS activity is heart rate variability (HRV). In our study, a 5-minute long, one lead electrocardiogram (ECG) is recorded using Polar H10 pulse sensor, a commercially available device that has been validated as a reliable tool for obtaining data for HRV analysis (5). The data is then transferred to the computer for it to be analyzed using Kubios HRV – a specialized software validated to be used in HRV research (6) (Fig. 2).

PROGRESS

- The study was approved by the Bioethics Committee of the Medical University of Łódź in April 2024.
- The study is covered by mandatory insurance for medical experiments conducted as part of the Medical University of Łódź.
- The procedure of acquiring ECG data for HRV analysis using Polar H10 pulse sensor has been tested in a hospital environment and has proven to be comfortable for patients, easy to perform and effective.
- Several patients from Nephrology Outpatient Clinic of Central Clinical Hospital of Medical University of Łódź are being recruited into the study for the time being.

Table 1

Performed procedures.

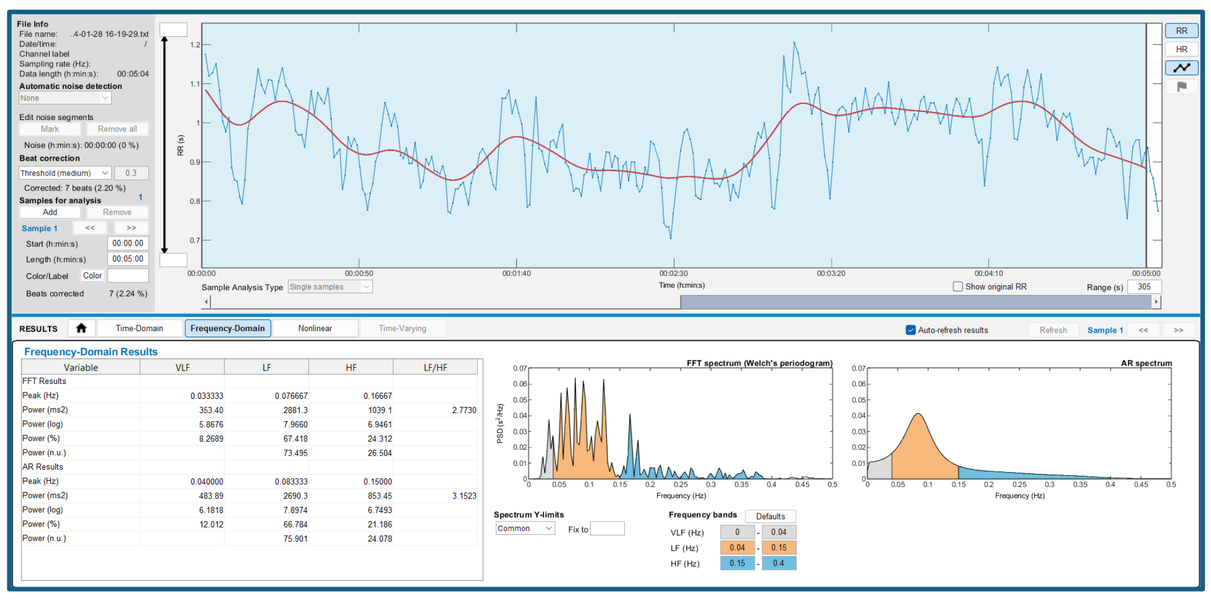
- **Heart rate and blood pressure** measurement
- Recording of a 5-min long, one lead ECG for **HRV analysis**
- Assessment of **norepinephrine** concentration in blood
- Assessment of **chromogranin A** concentration in blood
- Assessment of **renin** concentration in blood
- Assessment of **aldosterone** concentration in blood
- Assessment of **plasma renin activity** in blood

Figure 1

Schedule of visits in the study.

Figure 2

Example of HRV analysis performed using Kubios HRV software.



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