Early Effect of Sodium-glucose Cotransporter 2 Inhibitors on Hemodynamic and Metabolic Markers in Patients with Type 2 Diabetes

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Background: What mechanisms exactly contributing to the reduction of cardiovascular (CV) mortality by empagliflozin (EMPA-REG OUTCOME Study) is still unclear. However, the rapid reduction within 2 to 3 months in CV events in empagliflozin-treated subjects could suggest a hemodynamic mechanism of action.

Objective: To evaluate the relatively rapid effect (28 ± 7 days) of sodium-glucose cotransporter-2 (SGLT-2) inhibitors (empagliflozin or dapagliflozin) on either hemodynamic marker (NT pro-BNP), or metabolic markers (apolipoprotein B and hs-CRP) which are possible mechanisms that could contribute to the reduction of CV mortality.

Methods: This single center, open-label, prospective study included 34 patients with type 2 diabetes (A1c 8.1 ± 0.79%, body mass index (BMI) 28.88 ± 4.04 kg. m⁻²). The patients were allocated to receive empagliflozin (n = 21; 9 were patients with established CV diseases) or dapagliflozin (n = 13) as add-on treatment. Fasting blood samples were collected before and 28 ± 7 days after this intervention. Comparison of body weight (BW), blood pressure (BP), estimated glomerular filtration rate (eGFR), fasting plasma glucose (FPG), lipid profiles, ketone, NT-proBNP, apolipoprotein B, and hs-CRP were performed using the paired t test.

Results: During 28 ± 7 days, SGLT-2 inhibitors significantly decreased BW, BP, FPG, and plasma triglycerides. There were trends of lowering the percentage change of NT-proBNP (-0.88 ± 55.45 %), apolipoprotein B (-0.12 ± 20.13 %), and hs-CRP (-39.82 ± 132.83 %), but they were not all significantly changed. Whereas, no significant increase was noted in eGFR and serum ketone.

Conclusion: These study findings could emphasize that the CV benefit of SGLT-2 inhibitors in treatment of patients with type 2 diabetes would have an early effect on both hemodynamic and metabolic markers. In addition, the CV benefit of SGLT-2 inhibitors (empagliflozin, dapagliflozin) may be a class effect.

Keywords: Sodium-glucose cotransporter-2 (SGLT-2) inhibitors, NT pro-BNP, Apolipoprotein B, hs-CRP