Plasma Endothelin as a Target of Therapeutic Effects of the Diabephyt Antidiabetic Medicinal Herbal Collection

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Abstract:

Nowadays, type 2 diabetes (T2D) is one of the most common and economically impacting chronic diseases among the population. At the same time, from the pharmacological point of view, natural origin medications are cost-effective therapy options. A characteristic feature of T2D is polymorbidity (chronic inflammation, cardiovascular, neurological diseases, etc), which underlines the feasibility and necessity for multifunctional treatment. Many of the T2D-related cardiovascular complications are pathogenetically attributable to the endothelial dysfunction, referred to as vascular homeostasis dysregulation resulting from an imbalance in biologically active substances production, and namely, NO-signaling impairment and ET-1 over-expression.

ET-1 is an endothelium-derived vasoconstrictor present in normal plasma. Its circulating concentrations evidently elevate in diseases, characterized by endothelium-dependent abnormal relaxation to acetylcholine action. This study's objective was to determine the endothelin level changes after phytotherapy provided with the ethno-botanical medicinal herbal collection Diabephyt and Nivalin (plant-derived acetylcholinesterase inhibitors).

The phyto-collection Diabephyt contains leaves of Stevia rebaudiana (15%), Lycium barbarum (15%), Leonurus cardiac Lamiaceae (12%), Melissa officinalis Lamiacea (10%), Menthapiperita Lamiacea (8%), Hypericum perforatum Lamiacea (10%), Smilax officinalis Lamiacea (10%), Sambucusnigra (10%) and GanodermaLucidum (10%).

The superoxide dismutase activity manifested by Diabephyt was determined thereby superoxide (O2-) radicals formed during the hydrogen peroxide cleavage by NH4O, with the following discoloration by Coomassie brilliant blue dye. This pigment was depressed by Diabephyt, and the specific activity was expressed as 0.3 unit/mg/ml.

ET-1 plasma concentrations were determined after the phytotherapy conducted by Diabephyt (50 mg/kg/daily) and Nivalin (0.25 mg/kg/daily) for 3 weeks in rats. The plasma endothelin immunoreactivity in the control group (n=20) was 2.91±0.01, in the Diabephyt group (n=20) – 3.36±0.27, and in the Nivalin group (n=20) – 4.63 ±0.19. In our study, in the experimental animals' Nivalin group, an increase in endothelin levels by 59.1% was detected compared to the same indices in the control group. In the Diabephyt group, a decrease in endothelin levels by 27.4% was observed compared to the Nivalin group's indices. The statistical analysis characteristics were as follows: $F=415.97$, $P<0.0001$.

This study supports the role of plasma endothelin as a participant in the vascular function alteration and underscores it as a possible target for therapeutic processes. Diabephyt herbal collection's synergistic activity suggests a more effective targeting of mechanisms of preventing diabetic angiopathy complications development.

Key words: Antidiabetic herbal collection, endothelin, superoxide dismutase.

Abbreviations:

T2D – Type 2 diabetes
NO – Nitric oxide
ET – Endothelin