Relationship between the rheological properties of the blood and changes of oscillations in skin temperature after cold test in patients with type 2 diabetes mellitus

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Abstract

The aim of the study is to evaluate the relationships between the rheological properties of blood and the dynamics of changes of the temperature oscillations corresponding to the myogenic, neurogenic and endothelial regulation of vascular tone in patients with type 2 diabetes.

In 10 patients with diabetes mellitus type 2 and 9 healthy matched controls the skin temperature was continuously measured on the palm surface of the distal phalanx of the second (index) finger with two closely-spaced sensors under basal conditions (10 min), during contralateral hand immersion in cold water (3 min) and thereafter (10 min) by Microtest device.

The wavelet transformation analysis was used to study the localized variations of the low amplitude oscillations of skin temperature in accordance with myogenic (0.05 – 0.14 Hz), neurogenic (0.02 – 0.05 Hz), and endothelial (0.0095 – 0.02 Hz) control mechanisms.

In both patients groups whole blood viscosity at shear rates of 0, 0237s\textsuperscript{-1} to 128,5s\textsuperscript{-1} was measured by a rotational viscometer Contraves Low Shear 30 (Switzerland). The basic hemorheological constituents: hematocrit (Ht), whole blood (WBV) and plasma viscosity (PV) were also investigated. The increased blood viscosity in patients versus controls was correlated with the decrease of the amplitude of the oscillations of the skin temperature.

Keywords: Type 2 diabetes mellitus, hemorheological properties, skin temperature fluctuations