Impact of environmental temperature on skin thickness and microvascular blood flow in subjects with and without diabetes

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BACKGROUND: Glucose measurement from different skin areas might be influenced by changes in skin texture due to several environmental confounders. Our study was performed to investigate the effect of changes in ambient temperature on skin thickness and microvascular skin blood flow in subjects with and without diabetes at the lower forearm. METHODS: Thirteen subjects with diabetes and seven without diabetes participated in the study. The investigations were performed in a temperature- and humidity-controlled climatic chamber (EMPA, St. Gallen, Switzerland). Starting at 25 degrees C, the environmental temperature was changed in 4 degrees C steps every 40 min. Skin thickness was measured by an ultrasonic reflection technique, and microcirculation was measured by laser Doppler fluxmetry at the lower forearm. Study participants underwent the entire procedure on up to four separate study trials. RESULTS: Our study revealed a significantly reduced skin thickness (P<0.05) and microvascular blood flow (P<0.05) in patients with diabetes mellitus compared with controls without diabetes during the entire investigation. During declining ambient temperature a significant reduction in skin thickness (with diabetes, -0.09 +/- 0.13 mm; without diabetes, -0.06 +/- 0.11 mm; P<0.05) and microvascular blood flow (with diabetes, -41 +/- 49 arbitrary units; without diabetes, -46 +/- 51 arbitrary units; P<0.05) could be observed in both groups without significant differences between the two. CONCLUSIONS: Although skin thickness and microvascular skin blood flow at the lower forearm were found to be reduced in patients with diabetes compared with controls without diabetes, both groups revealed comparable dynamics in skin thickness and microvascular blood flow during changes in environmental temperature.