Sudoscan, a Non invasive Tool for Detecting Diabetic Small Fiber Neuropathy and Autonomic Dysfunction

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Abstract

Objective: Sudomotor dysfunction may be an early detectable abnormality in diabetic small fiber neuropathy. The aim of this study was to evaluate the efficacy of Sudoscan (ImpetoMedical, Paris, France) in detecting diabetic neuropathy (DN), in comparison with other standardized tests, in patients with diabetes mellitus (DM).

Subjects and Methods: Sudoscan measures electrochemical skin conductance (ESC) of hands and feet through reverse iontophoresis. We evaluated 83 DM patients with and without DN and 210 healthy controls (HCs). Neuropathy Impairment Score—Lower Legs (NIS-LL), quantitative autonomic function testing (QAFT), and quantitative sensory testing (QST) were performed. Symptomatic pain was recorded using a visual analog scale. Receiver-operator characteristic (ROC) curves were calculated to evaluate the efficacy of Sudoscan in detecting DN compared with traditional modalities.

Results: Diabetes patients with DN had significantly worse ESCs of feet and hands than DM patients without DN and HCs (respectively, 56.3 – 3 vs. 75.9 – 5.5 and 84.4 – 0.9 [P < 0.0001] for feet and 51.9 – 2.4 vs. 67.5 – 4.3 and 73.1 – 0.8 [P < 0.0001] for hands). Increasing NIS-LL scores were associated with decreasing ESC values. ESCs correlated significantly with clinical (NIS-LL), somatic (QST), and autonomic (QAFT) measures of neuropathy and with pain scores. ROC curve analysis showed significant results for both hands and feet ESC (area under the curve of 0.86 and 0.88, respectively; P < 0.0001) with sensitivity of 78% and specificity of 92% for feet to detect DN.

Conclusions: Sudoscan is a promising, sensitive tool to detect neuropathy in patients with DM. This is a very simple, easy-to-perform test that can be done in the clinical setting in 3–5min.