

Sudoscan: A simple, rapid, and objective method for screening of peripheral neuropathy

Santosh Ramakrishnan

Apollo Hospitals, India

Abstract

Background: Sensorimotor dysfunction is mainly considered for the diagnosis of peripheral neuropathy. Autonomic small C-Fibers innervating sweat glands are thin, long and unmyelinated and can be damaged very early in the diabetes process. Sweat dysfunction leading to abnormal skin conditions could increase diabetic foot risk. A consensus statement of American Diabetes Association has suggested that sudomotor function should be included in diagnostic tests for the detection of neuropathies in diabetes but lack of simple, and quick methods have restricted the widespread of such examination. The aim of this study was to evaluate SUDOSCAN a new method to measure sudomotor function as a screening tool for diabetic peripheral neuropathy.

Materials and methods: 191 patients with type 2 diabetes (age 51 ± 11 years, diabetes duration 8 ± 6 years, BMI 28 ± 5 kg/m²) were measured for Vibration Perception Threshold (VPT) using a biothesiometer with ≥ 15 V as cut-off value for diagnosis of peripheral neuropathy. Retinopathy status and renal function, based on estimation of glomerular filtration rate using Modification of Diet in Renal Disease (MDRD), were also assessed as indicators of microvascular lesions. All patients underwent the SUDOSCAN test. Patients place their hands and feet on stainless-steel electrodes and an incremental low direct voltage (< 4 V) is applied during a 2 minute interval. Electrochemical Sweat Conductance (ESC) as a measure of sudomotor function was obtained from the voltage and current applied. Quantitative results are expressed as ESC (microsiemens, μ S) for the hands and feet. A risk score for cardiac neuropathy was calculated based on these values and demographic data.

Results: Based on biothesiometer examination, patients were classified in two groups: Patients with or without neuropathy.

Table: Demographic, biological and Electrochemical Sweat Conductances (ESC) according to neuropathy status diagnosed by biothesiometer (threshold value 15 V)

	No neuropathy n=139 (male, 63%)	Neuropathy n=49 (male, 78%)	P*	P adjusted**
Age (Years)	49 \pm 10	59 \pm 9	<0.001	-
Duration diabetes (months)	82.3 \pm 61.2	146.3 \pm 95.6	<0.001	0.003
BMI (Kg/m ²)	27.7 \pm 5.1	27.3 \pm 3.8	NS	-
Waist (cm)	98.5 \pm 10.7	98.9 \pm 8.2	NS	-
Systolic blood pressure (mm Hg)	123.6 \pm 13.2	124.2 \pm 17.9	NS	-
FPG (mmol/L)	8.7 \pm 3.4	9.0 \pm 4.7	NS	-
HbA _{1c} (%)	8.5 \pm 2.2	8.5 \pm 1.9	NS	-
ESC hands (μ S)	60 \pm 17	53 \pm 21	0.020	0.125
ESC feet (μ S)	69 \pm 15	60 \pm 22	0.003	0.037
Cardiac neuropathy risk score (%)	35 \pm 15.2	44 \pm 12.9	<0.001	NS
Nephropathy (%)	5%	29%	<0.001	0.058
Retinopathy (%)	11%	38%	<0.001	0.011

* One way ANOVA

** ANOVA adjusted on age

Conclusion: Sweating status using SUDOSCAN a simple, quick and non invasive method may be used as a screening tool of diabetic peripheral neuropathy. Relevance of the method could be explained by earlier damages in small C-fiber when compared to large fibers.

Biography

R. Santosh did his MBBS from BJ Medical College Pune, MD Medicine from JIPMER, Pondicherry and DM Endocrinology from PGI, Chandigarh. Presently he is working as Consultant Endocrinologist, as Apollo Hospital, Health City, Jubilee Hills, Hyderabad. He has published more than 23 papers in reputed journals and presented in many National and International Conferences. He also addressed more than 60 CME sessions.