

SAMATVAM: ENDOCRINOLOGY DIABETES CENTER

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STANDARDS IN DIABETES CARE: NEED FOR SIMPLE CLINICAL AUTONOMIC NERVOUS SYSTEM EVALUATION

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The worldwide prevalence of diabetes mellitus (DM) has risen dramatically over the past two decades. Although the prevalence of both type 1 and type 2 DM is increasing worldwide, the prevalence of type 2 DM is expected to rise more rapidly in the future because of increasing obesity and reduced activity levels. Immediate action is needed to stem the tide of diabetes and to introduce cost-effective primary and secondary prevention strategies. Effective prevention also means more cost-effective healthcare. This may be the prevention of the onset of diabetes itself (primary prevention) or the prevention of its immediate and longer-term consequences (secondary prevention). Secondary prevention includes early detection, prevention and treatment. Appropriate action taken at the right time is beneficial in terms of quality of life and is cost-effective. The treatment of high blood pressure and raised blood lipids, as well as the control of blood glucose levels, can substantially reduce the risk of developing both macrovascular complications (coronary artery disease, peripheral vascular disease and cerebrovascular disease), and microvascular complications (retinopathy, nephropathy and neuropathy) and also slow their progression in all types of diabetes.

Diabetic neuropathy is a dreaded chronic complication of DM, a neuropathy which can be peripheral and/or autonomic. Diabetic autonomic neuropathy (DAN) may be either clinically evident or subclinical and affects every system in the body (cardiovascular, sudomotor, gastrointestinal, genitourinary and pupillary). Autonomic neuropathy may reduce counter-regulatory hormone release, inability to sense hypoglycemia appropriately, thereby subjecting the patient to the risk of severe hypoglycemia and complicating efforts to improve glycemetic control.

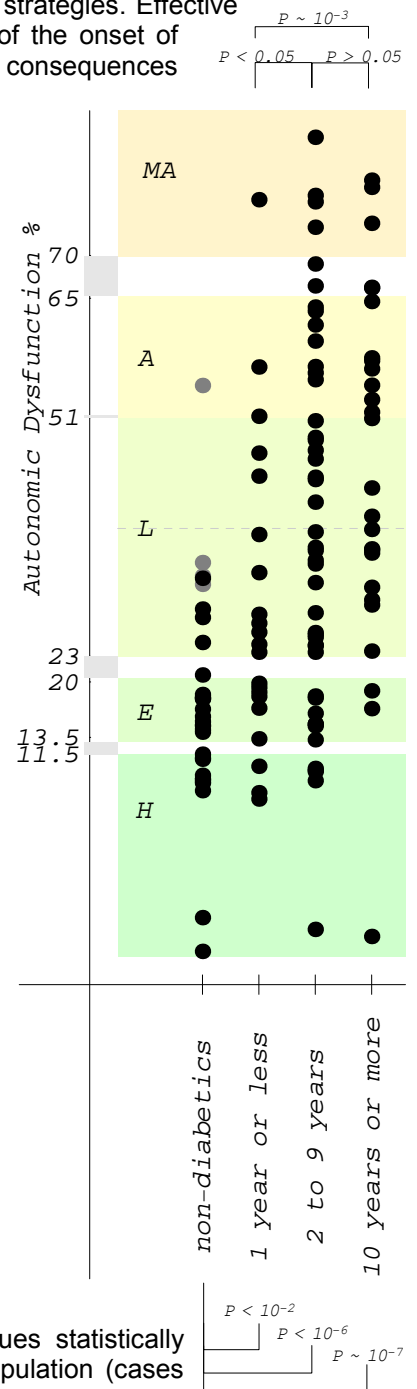
The American Diabetes Association has recommended heart rate variability (HRV) testing for diabetic autonomic neuropathy on annual basis as early as 1988. However, because the tests were time-consuming, not easily done and inaccurate, testing is not widespread. The recently introduced ANSiscope (DyAnsys, USA) is a quick (5 to 7 minutes) and simple way (supine position without involvement of manoeuvres) of diagnosing diabetic autonomic neuropathy early and can become a standard measurement in such cases. The machine gives a quantitative reading (a percentage of autonomic dysfunction) of neuropathy and patients can be monitored over time to determine if the neuropathy is stabilizing, advancing or regressing.

For diabetic patients, the ANSiscope allows early detection of preclinical diabetic neuropathy, likely at a reversible stage; permits documentation of reversal of early DAN with improved glycemetic control; with its exact and real-time measurement, the ANSiscope facilitates the evaluation of efficacy of potential and future therapeutic modalities which can reverse the basic pathophysiology of DAN.

At the SAMATVAM Endocrinology Diabetes Center (Bangalore, India), a clinical validation study of the ANSiscope in diabetes was undertaken. Four groups of subjects were studied: non-diabetics (32 cases); one year or less of type-2 diabetes (21 cases); 2 to 9 years of type-2 diabetes (46 cases); and more than 10 years of type-2 diabetes (26 cases). Results are represented in the opposite figure.

The distribution of the dysautonomia among the diabetes duration groups clearly indicates that diabetic patients are all concerned by autonomic dysfunction. Elevated autonomic dysfunction scores strikingly corroborate the duration of the chronic disease. The patients with less than a year of diabetes already have values statistically different (Welch t-test that the difference in means is null) from the non diabetic population (cases depicted in gray were found with HbA1c > 6%). Furthermore, the difference observed between groups increases in a stepwise manner (5 categories of DAN are found here: Healthy (H), Early (E), Late (L), Advanced (A) & Most Advanced (MA)) with the duration of diabetes.

Thus, evaluation of ANS function using the ANSiscope should be a mandatory part of diabetic health reviews for type-2 diabetes at diagnosis and annually thereafter. For children with type-1 diabetes, initial evaluation 5 years after diagnosis, and annually thereafter, seems appropriate.



Statistical significance: $P < 10^{-2}$ (between non-diabetics and 1 year or less), $P < 10^{-6}$ (between non-diabetics and 2 to 9 years), $P < 10^{-7}$ (between non-diabetics and 10 years or more).