Precision of Michigan Neuropathy Screening Instrument (MNSI) Tool for the Diagnosis of Diabetic Peripheral Neuropathy Among People with Type 2 Diabetes—A Study from South India

Vijay Viswanathan, MD, PhD[1] (iD),
Balkhiwala Ahmed Khan, BPT, MIAP[1],
Sukanya Nachimuthu, MPH[2] (iD), and
Satyavani Kumpatla, MSc, M.Tech, PhD[1]

Abstract

Diabetic peripheral neuropathy (DPN) is one of the risk factors for foot-related complications among people with type 2 diabetes mellitus (T2DM). Hence, we aimed to validate the Michigan Neuropathy Screening Instrument (MNSI) tool against biothesiometer with a cut-off value of $\geq$25 V and also to determine the cut-off point of MNSI score for the diagnosis of diabetic neuropathy among people with T2DM in India. A cross-sectional study was conducted among 357 people with T2DM in a tertiary care centre for diabetes in Chennai, South India. The eligible study participants underwent testing with a biothesiometer and the MNSI tool was administered. The patient version tool of MNSI was translated to the local language, Tamil. The MNSI scores (1, 1.5, 2, and 2.5) were compared with biothesiometer value. For the MNSI scores of less than 1, 1.5, 2, and 2.5, sensitivities were 97.6%, 97.6%, 96.8%, and 77.8% and speci cities were 76.6%, 77.9%, 85.7%, and 88.3% respectively. The cut-off value of MNSI score was derived as two with AUC of 0.934. The sensitivity was 96.8% and the speci city was 85.7% with 89.6% accuracy. The high sensitivity indicates the positive cases are diagnosed correctly. There is no validated tool available for detection of DPN in Indian population. The Indian version of MNSI tool was found to be effective for screening diabetic neuropathy among people with T2DM. The MNSI tool was found to be reliable, convenient, and non-invasive for diagnosis of DPN and can be used in routine clinical settings.

Keywords

diabetic neuropathy, MNSI tool, validation, type 2 diabetes, India

Introduction

In India, 74.2 million people are currently living with diabetes which is predicted to rise to 124.9 million by the year 2045, according to the recently released International Diabetes Federation Atlas.[1] Diabetic peripheral neuropathy (DPN) is the most common complication of diabetes, almost 50% or more people with diabetes develop DPN. The prevalence of DPN varied between 9.6% to 78% in different populations in India.[2–5] DPN causes foot complications which lead to severe morbidity and mortality.[6] The foot complications also contribute to the individual's financial burden.[7] Hence, prevention, timely detection, and treatment of DPN play a vital role in reducing the disease burden.

The nerve conduction study (NCS) is considered as a gold standard test for the diagnosis of DPN which evaluates the occurrence and development of neuropathy by detecting the ability of the peripheral nerve to transmit electrical signals in individuals. The test is time-consuming, expensive, and requires professional training to conduct the test.[8] Vibration perception thresholds (VPT) using biothesiometer is used to detect peripheral neuropathy.[9] Based on clinical signs and symptoms, quantitative sensory testing, sudomotor function, neurophysiology, skin punch biopsy, and corneal

[1]MV Hospital for Diabetes and Prof M Viswanathan Diabetes Research Centre, Chennai, India
[2]Department of Epidemiology, Prof M Viswanathan Diabetes Research Centre, Chennai, India

Corresponding Author:
Vijay Viswanathan, MV Hospital for Diabetes & Prof M Viswanathan Diabetes Research Centre, No. 4, West Mada Church Street, Royapuram, Chennai 600013, India.
Email: drvijay@mvdiabetes.com