Peripheral Nerves Cross-Sectional Area for the Diagnosis of Diabetic Polyneuropathy: A Meta-Analysis of Ultrasonographic Measurements

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Abstract : 1) Background It has been hypothesized that, in individuals with diabetes mellitus, the peripheral nerve is swollen due to sorbitol over-accumulation. Additionally growing evidence supported electro diagnostic study of diabetes induced neuropathy as a method having some challenges. 2) Objective To examine the performance of sonographic cross-sectional area (CSA) measurements in the diagnosis of diabetic polyneuropathy (DPN). 3) Data Sources Electronic databases, comprising PubMed and EMBASE and Google scholar, were searched for the appropriate studies before Jan 1, 2020. 4) Study Selection Eleven trials comparing different peripheral nerve CSA measurements between participants with and without DPN were included. 5) Data Extraction Study design, participants' demographic characteristics, diagnostic reference of DPN, and evaluated peripheral nerves and methods of CSA measurement. 6) Data Synthesis Among different peripheral nerves, Tibial nerve diagnostic odds ratios pooled from five studies (713 participants) were 4.46 (95% CI, 0.35–8.57) and the largest one with $P<0.0001$, I^2:64%. Median nerve CSA at wrist and mid-arm took second and third place with ORs= 2.82 (1.50-4.15), 2.02(0.26-3.77) respectively. The sensitivities and specificities pooled from two studies for Sural nerve were 0.78 (95% CI, 0.68–0.89), and 0.68 (95% CI, 0.53–0.74). Included studies for other nerves were limited to one study. The largest sensitivity was for Sural nerve and the largest specificity was for Tibial nerve. 7) Conclusions The peripheral nerves CSA measured by ultrasound imaging is useful for the diagnosis of DPN and is most significantly different between patients and participants without DPN at the Tibial nerve. Because the Tibial nerve CSA in healthy participants, at various locations, rarely exceeds 24 mm2, this value can be considered as a cutoff point for diagnosing DPN.

Keywords : diabetes, diagnosis, polyneuropathy, ultrasound
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