

Mini Review

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Evidence-Based Assessment of Pediatric Diabetic Peripheral Neuropathy



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Mini Review

The global burden of diabetes is currently estimated at 425 million and rising [1]. Unfortunately, this well-documented increase in diabetes among adults is mirrored by a similar trend in the pediatric population [2-4]. Further analysis reveals a disturbing increase in Type 2 diabetes among these patients which some have linked to a rise in childhood obesity [5].

This combination of diabetes and obesity in adulthood can lead to devastating foot complications including lower extremity amputations. Another one of the essential precursors on the path to limb loss is diabetic peripheral neuropathy (DPN).

Although neurological screening for DPN is routine in adults, pediatric patients often are not assessed for this complication. Despite the fact that up to 25% of pediatric diabetic patients have neuropathy, the majority are subclinical possibly explaining this oversight [6]. Furthermore, widely accepted guidelines for neurological screening in this patient population have not been established. Although several studies have evaluated the efficacy of screening tools currently in use, consensus has not been reached on a standardized approach [7]. A summary of relevant research on this topic is found in Table 1.

Table 1: Selected studies evaluating DPN testing methods in pediatric patients

Method	Study	Finding
10-gram SWMF ^a	Hirschfeld et al. [8] (Systematic Review)	Low diagnostic utility
128 Hz Tuning Fork	Hirschfeld (Systematic Review)	Low diagnostic utility
Biothesiometer	Hirschfeld (Systematic Review) Olsen et al. [9]	Acceptable diagnostic utility
NCV ^b	Hasani et al. [6]	Highest diagnostic utility

A: Semmes-Weinstein Monofilament; b: Nerve Conduction Velocity

Evidence-Based Recommendations



Figure 1: Biothesiometer (Bio-Medical Instrument Co. Newbury, OH).

In light of the known potential complications in adulthood, most experts recommend routine screening for early neuropathy in pediatric diabetic patients even when the condition is subclinical. Research has shown NCVs to be the gold standard for neurological assessment in adult and pediatric patients. Unfortunately, this test is invasive, painful, expensive and time-consuming. A more practical screening method is assessment of vibration perception thresholds (VPTs) with a biothesiometer (Figure 1). Although this method is painless and non-invasive, most clinicians have not purchased the device. Additionally, the test can take several minutes to perform properly and usually requires a dedicated space as the biothesiometer is large and relies on a wall outlet for power.



Figure 2: ETF128 (O'Brien Medical, LLC Orono, Maine).

Another alternative is the newly available ETF128 (Figure 2). This portable, point-of-care instrument combines the standardization of the biothesiometer with the ease of use and speed of the traditional tuning fork test. An integrated timer allows clinicians to perform accurate timed vibration tests to rapidly gauge large fiber nerve function [10,11]. The numerical value obtained from this test can be used to track nerve function over time. A scale on the device provides guidance on levels of neuropathy present. Although new to the market, it is ideally suited to the assessment of diabetic neuropathy in adult and pediatric patients.

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