

Evaluating the Impact of Spinal Cord Stimulation on Quality of Life in Patients With Painful Diabetic Neuropathy: A Meta Analysis

Moaid Shaik, Monish Moyal, Saiprashant Rajesh, and YS Mohan, MD
Michigan State College of Human Medicine

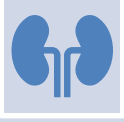
Introduction

As of 2024, over 537 Million adults worldwide live with diabetes
Many develop diabetic neuropathy, leading to pain, numbness, falls, and reduced quality of life.
Current FDA-approved treatments (e.g., pregabalin, duloxetine, tapentadol) often provide incomplete relief.
Spinal cord stimulation (SCS) is emerging as a therapy that reduces pain ,but most studies only measure pain scores, not overall quality of life (QOL).
Gap: No recent systematic review/meta-analysis has synthesized QOL outcomes of SCS in diabetic neuropathy.
Our study: Meta-analysis evaluating SCS impact on QOL domains(mobility, sleep, mood, daily function) to inform patient counseling andhighlight knowledge gaps.

Methods

 PRISMA-guided systematic review (search through June 2025)

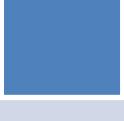
 Databases: MEDLINE, Embase, Cochrane (2015–2025)

 Keywords: “spinal cord stimulation,” “diabetic neuropathy,” “quality of life”

 Inclusion: RCTs, retrospective, case-control, prospective studies, conference abstracts in adults with Type 1 or 2 diabetes, case reports/series

 Exclusion: Reviews, non-English, animal/cadaver studies

 Screening: multi-reviewer, independent review with consensus resolution.

 Quality of Life: EQ-5D, SF-36, Subjective Measures

Overall outcomes: ~75–80% of studies showed **sustained QOL improvement** with SCS (mobility, pain, sleep, psychological well-being, function).

Best responders: Patients with **moderate–severe, treatment-refractory PDN** derived greatest benefit.

Durability: Improvements confirmed at 12–48 months; some long-term (8–10 yr) follow-ups showed plateau/decline due to aging/comorbidities.

Results

Quality of Life Factor	-	Neutral	+
# of Studies	0	8	30

Table 4. Impact of Spinal Cord Stimulation on Quality of Life in Painful Diabetic Neuropathy. This table categorizes studies of SCS according to their reported impact on QOL. A “+” indicates significant improvement in QOL as measured by validated instruments (e.g., EQ-5D, SF-36, DQOL, QALYs) or clearly described functional/psychological benefits. “Neutral” indicates studies where no significant QOL changes were reported, QOL was not the primary focus, or results were inconclusive.

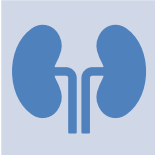
Retrospective	18
Prospective	18
Case	2

Table 3. Distribution of Study Designs in Spinal Cord Stimulation Research for Painful Diabetic Neuropathy. Retrospective studies (n = 18) and prospective studies (n = 18) were equally represented, while case reports comprised a small minority (n = 2).

Discussion

Prospective data (n=25): **84%** of studies show significant QOL improvement with SCS; no negative results.
○SENZA-PDN trial: Sustained QOL gains at 12 months → 4 years; EQ-5D scores exceed U.S. norms.
Retrospective data (n=33): **85%** report QOL improvement; neutral outcomes mostly in long-term follow-up due to aging/disease progression.
○Added benefits: better vascular outcomes, improved nerve conduction, reduced pain, higher patient satisfaction.
Limitations: Some variability in long-term QOL linked to comorbidities/advanced disease states.

Conclusions and Future Directions

 SCS is an effective, durable therapy for painful diabetic neuropathy, **improving quality of life in refractory cases.**

 Benefits extend beyond pain relief to include physical function, emotional well-being, and daily activities.

 Limitations: variable reporting, inconsistent QOL measures, incomplete follow-up.

 Overall, evidence supports SCS as a transformative treatment with meaningful impact on patient lives.

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