Use of Pulsed Electromagnetic Field Therapy (PEMF) as a Treatment for Peripheral Nerve Pain: A Case Series

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Purpose

This case series demonstrates that pulsed electromagnetic field therapy* can be an effective pain-reducing treatment in patients with varying etiologies of peripheral nerve pain in the lower extremity.

Background

Peripheral Nerve Pain

- Peripheral nerve pain results in substantial impact on quality of life, particularly by causing considerable interference in sleep, daily activities, and enjoyment of life
- Peripheral neuropathies are hereditary or acquired diseases affecting the cell body of peripheral sensory or motor neurons, their axon, or myelin.[1] Many can result in peripheral nerve pain (Figure 1).

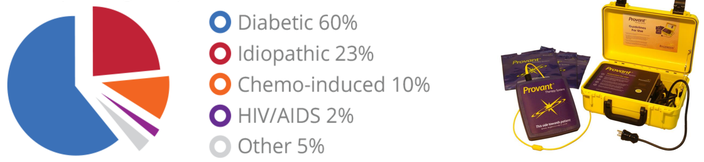


Figure 1: Prevalence of the types of Peripheral Nerve Pain [2]

Figure 2: PEMF Device [3]

Pulsed Electromagnetic Field Therapy (PEMF)

- PEMF is a non-invasive therapy involving delivery of non-thermal shortwave energy to provide pain relief.[4]
- PEMF has been found to be effective in clinical studies for post-operative pain, including in patients that experienced moderate-to-severe pain despite the use of common analgesics, but is not studied well for other etiologies of pain.[4] PEMF has been associated with a reduced consumption of analgesics.[5-8] A meta-analysis of studies assessing the clinical efficacy of PEMF also found that a significant proportion of studies that assessed PEMF use for pain reported a beneficial outcome.[9]

Materials and Methods

- We identified three patients with peripheral nerve pain of varying etiologies in the lower extremity. Each patient had been previously diagnosed and underwent electromyography.
- Each patient treated both feet with a 30 minute twice a day regimen of PEMF for 4 months.
- The PEMF device (Figure 2) emits a 27.12 mHz electromagnetic field transmitted from a flat spiral antenna with a radius of 7.5 cm made up of six turns at a width of 0.70 cm spaced with a separation of 0.3 cm. The field is delivered in 42 microsecond pulses with a period of 1 kHz.
- Pain assessment was performed using the Wong-Baker pain scale (0 to 10). Pain scores were recorded at the start and end of each month.
- All three patients reported compliance with the PEMF device (Figure 2).

Case Histories

Case #1: Alcoholic Nerve Pain

- A 55 year old non-diabetic (HbA1c 4.8%) American Indian male presented to the podiatry clinic for burning and tingling sensations in his feet.
- He admitted a history of alcoholism but denied current use of alcohol. He was taking three tablets of gabapentin 300mg three times a day and previously had tried pregabalin with minimal success.
- He related 7/10 burning pain that frequently came and went and usually was worse at night. He complained that he sometimes woke up at night and couldn't go back to sleep because of the pain.

Case #2: Diabetic Nerve Pain

- A 69 year old diabetic (HbA1c 7.0%) African American male, with a history of a left transmetatarsal amputation, presented to the podiatry clinic for diabetic foot care. He complained of new burning pains and "pins and needles" sensations in his feet.
- He denied any prior treatment for his neuropathy.
- He related 8/10 burning pain that frequently came and went and usually was worse at night. He complained that he sometimes would wake up in the middle of the night.

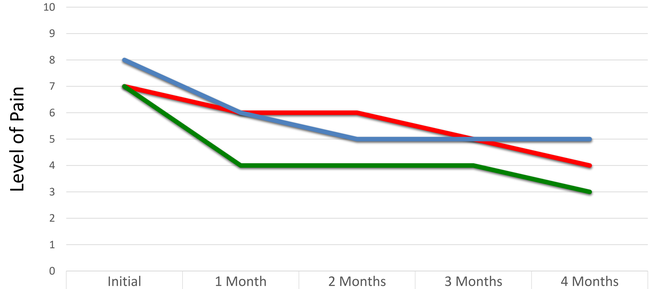
Case #3: Non-Freezing Cold Injury Nerve Pain

- A 62 year old non-diabetic (HbA1c 5.5%) African American Male presented to the podiatry clinic for worsening burning sensations in his feet.
- He admitted a history of Trench foot that occurred decades ago. He denied any prior current treatment other than lidocaine patches. He has tried gabapentin in the past but was unable to tolerate its side effects. He related that his 7/10 burning pain had been worsening over the last few months and caused him to occasional wake up during the night.

Results

- All three patients reported an improvement in the quality of their sleep and a decline in foot pain.

Patient Pain Scores by Month Wong-Baker Scale (0 to 10)



	Initial	1 Month	2 Months	3 Months	4 Months
Case 1	7	6	6	5	4
Case 2	8	6	5	5	5
Case 3	7	4	4	4	3

Limitations

- The study was mainly observational; therefore, we were not able to establish any statistical significance on the findings.
- The primary outcome measure was based on the Wong-Baker pain scale which was subjective.
- The follow-up period was brief and the study subjects were not blinded.
- Study subjects administered PEMF at home which made the assessment of compliance and standardization of PEMF difficult.

Conclusions & Future Studies

- The main outcome of this case series demonstrated that PEMF can be an effective non-pharmacological alternative for peripheral nerve pain management.
- Some secondary findings suggested that PEMF could improve quality of sleep as it improved pain control at night.
- With the advent of the opioid epidemic, many clinicians are looking for ways to contribute to reducing addiction and the over-prescribing of narcotics. Non-pharmacological interventions are strongly recommended by the "VA/DoD Clinical Practice Guideline for Opioid Therapy for Chronic pain." Future studies can include a focus on the on the benefit of using PEMF on peripheral nerve pain management by measuring opioid usage as an outcome. Further study of this promising technology is warranted.

Disclosure

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