

## Original Article

# EFFECT OF HIGH TENS ON NEUROPATHIC PAIN IN DIABETIC NEUROPATHY PATIENTS

Shahanawaz SD

Assistant Professor and PhD Scholar, School of Physiotherapy, RK University, Rajkot, Gujarat, India.

## ABSTRACT

**Background:** Diabetic Neuropathy is a condition that damages nerve in the body. High blood sugar levels affect the way nerves use glucose leading to an accumulation of sugar SORBITOL as depletion of substance called MYOINOSITOL with in nerves, contributing to nerve damage. Historically De calvi first showed the relationship between diabetes and peripheral nerve damage. Diabetes Mellitus is predicted to afflict 220 Million people worldwide by the year 2010, and approximately 30-60% of patients with Diabetes develop long-term of peripheral neuropathy and upto 10 to 20% of these patients experience pain. Pirart8, showed the incidence of Diabetic Neuropathy to be 7.5% at the time of diagnosis with a 1.7% annual increase. [International Diabetes Federation].

**Method:** Thirty subjects were divided equally 2 groups each containing subjects Group A were given TENS, (mean age 53.2, while group B was given placebo TENS mean age of 50.8 and Visual Analog Scale [VAS] scores > 5 were calculated and data collected for all the subjects prior to the treatment and after the treatment intervention. Wilcoxon method was used for analysis.

**Results:** The Experimental group (N=15) used TENS, the mean of Pre-treatment VAS Score is 8.46 and Post-treatment VAS Score is 2.6..And statistically when observed by using the Wilcoxon signed ranks test the obtained T Value =7 and it shows a significant.

**Discussion:** There are 2 potential mechanisms by which High – Frequency TENS can relieve the pain of diabetic neuropathy. It is possible that TENS alleviates pain by directly blocking abnormal spontaneous activity in small diameter pain mediating peripheral nerves. This mechanism requires electrical stimulation to be applied directly to spontaneously active nerve. In addition TENS can relieve the pain of diabetic neuropathy by altering nociceptive transmission in the dorsal horn of spinal cord. The second mechanism requires that stimulation be delivered to spinal cord segments that innervate the painful area.

**Conclusion:** TENS has shown a significant improvement on neuropathic pain in diabetic neuropathy patients when compare to the Placebo TENS and hence alternate Hypothesis is accepted Null Hypothesis is rejected.

**KEY WORDS:** TENS, Peripheral nerves, Diabetic Neuropathy, Myoinositol, VAS, Pain.

**Address for correspondence:** Shahanawaz SD, Assistant Professor and PhD Scholar, School of Physiotherapy, RK University, Rajkot, Gujarat, India. **E-Mail:** shanu.neuropt@gmail.com

## Access this Article online

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International Journal of Physiotherapy and Research

ISSN 2321- 1822

[www.ijmhr.org/ijpr.html](http://www.ijmhr.org/ijpr.html)

Received: 08-06-2014

Accepted: 02-07-2014

Peer Review: 08-06-2014

Published: 11-08-2014

## INTRODUCTION

Diabetic Neuropathy is a condition that damages nerve in the body. High blood sugar levels affects the nerves that uses glucose leading to an accumulation of sugar SORBITOL as depletion of substance called MYOINOSITOL with in nerves, contributing to nerve damage. Historically De calvi first showed the relationship between diabetes and peripheral nerve damage. Diabetes Mellitus is predicted to affect 220 Mill-

ion people worldwide by the year 2010, and approximately 30-60% of patients with Diabetes develop long-term of peripheral neuropathy and up to 10 to 20% of these patients experience pain. Pirart8, showed the incidence of Diabetic Neuropathy to be 7.5% at the time of diagnosis with a 1.7% annual increase. [International Diabetes Federation]. Pain arises from excessive stimulation of sensory end organ. Pain from summation above a critical at dorsal horn.

neurons. Lesions of central nervous system can abolish pain exclusively. Pain elicited A and C fibers Pathological associated with inflammation, Neuropathy. Transcutaneous electrical nerve stimulation [TENS] currently is one of the most commonly used forms of electro analgesia. Hundreds of clinical reports exist concerning the use of TENS for various types of conditions such as low back pain (LBP). Myofascial and arthritic pain, sympathetically mediated pain, bladder incontinence, visceral pain, and post surgical pain.

The Aim of the study is to find out the variation in pain intensity using Transcutaneous Electrical Nerve Stimulation [TENS] in Diabetic Neuropathic Pain Patients. Objective of this study is to understand the physiological changes that occur in Diabetic Neuropathic Pain individuals, with the application of Transcutaneous Electrical Nerve Stimulation [TENS].

Null Hypothesis: There will be no effect of TENS on Neuropathic pain in Diabetic Neuropathic Patients.

Alternative Hypothesis: There will be a significant decrease in Neuropathic pain in Diabetic Neuropathy patients with the application of TENS.

**METHODOLOGY**

Thirty subjects were divided equally 2 groups each containing subjects Group A were given TENS, (mean age 53.2, while group B was given placebo TENS mean age of 50.8 and Visual Analog Scale [VAS] scores > 5 were calculated and data collected for all the subjects prior to the treatment and after the treatment intervention.

Wilcoxon method was used for analysis.

**Source of data**

Subjects diagnosed with diabetic neuropathy. Suffering with neuropathic pain referred for physiotherapy from

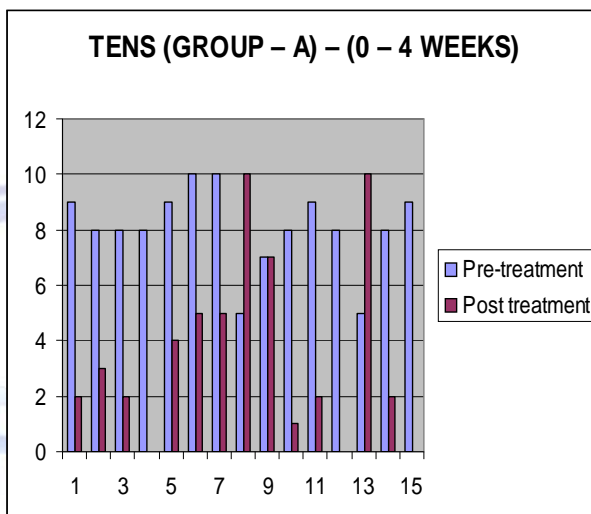
1. Department of Physiotherapy, School of Physiotherapy RK University.
2. Department of Physiotherapy, Extension of School of Physiotherapy Bhakthinagar Circle, RK university.

Method of Collection of Data: Type of sampling: Randomized Controlled Sampling Sample Size is 30 Individuals.

**Table 1:** Showing the Sample and interventions used.

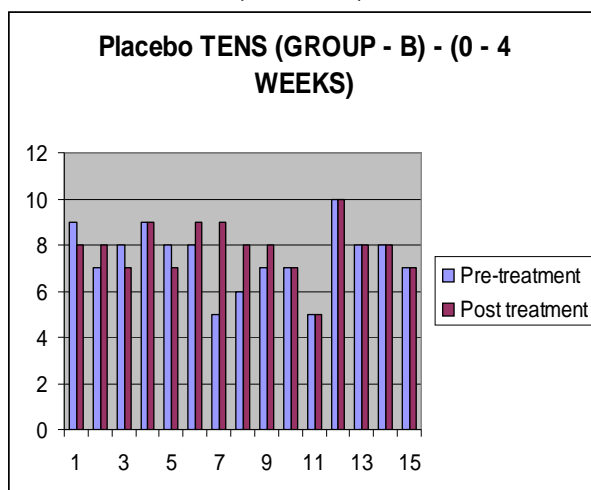
	Intervention	Subjects	Age Group
Group A	TENS	15	40 – 70 Years
Group B	Placebo TENS	15	40 – 70 Years

**Graph 1:** showing the comparison between Pre-treatment and Post treatment TENS Group A (0-4 Weeks).



The group A (Experimental Group) received the treatment frequency of 100 HZ and Pulse width is 200-400 micro seconds and intensity is tolerable limit and the session are 2 session per day for 4 weeks and 6 days per week and the total duration of the treatment was 24 days

**Graph 2:** showing the comparison between Pre-treatment and Post treatment Placebo TENS Group B (0-4 Weeks).



The Group B (Placebo Group) the frequency is 0HZ and Pulse width is 0 microseconds and intensity is 0 seconds and duration is 20 minutes and 2 session per day and the total duration is

24 days 4 weeks 6 days per week.

Type of Study: Experimental Study

Materials used: Treatment Table, Pillow, Cotton, Conductive Gel, TENS unit, Visual Analog Scale (Assessment Chart).

For this Study we included the subjects between the Age group of 40-70 years of the both genders, with [Type I & II] diabetes mellitus and they diagnosed as Diabetic Neuropathy and having Neuropathic Pain [Feet, lower extremities, low – back], and Visual Analog Scale [VAS] more than 5. Exclusive Criteria included Total loss of sensation, Spinal injuries, Perceptual disorders, Patients with musculo skeltel disorders, Patients with associated Neurologic disorders.

## PROCEDURE

### Experimental Procedure

The physical therapist prepared the skin by gently cleaning it with an alcohol wipe. A self adhesive surface electrode was placed about 1.3cm (1/2 inch) lateral to the right posterior superior iliac spine on the back. A second electrode was placed in the same position on the left side of the back.

The electrodes were attached to a Dual Channel table top TENS (INDOTENS) Transcutaneous Electric Nerve Stimulation set at a constant frequency of 100Hz, the pulse width can be adjustable 200-400 micro seconds and duration is 20 minutes. The intensity of stimulation was slowly increased until the patient could perceive the stimulation but was not made uncomfortable. The methods were used to assess the patient's perception of pain. The first was used once on initial evaluation. The patient was asked to express the magnitude of pain on a scale of 0 to 10, with 0 being "no pain atoll and 10 being the worst pain you can imagine the second assessment was used to document the area of body that was painful. The patient was given a sketch of the body and was asked to draw the areas of his or her body that were painful. The patients drawing were consistent with his or her description of the location and extent of painful area. Finally the patient was given a Visual Analog Scale (VAS) was used to assess the intensity of perceived pain. A Visual Analog Scale (VAS) was used to assess the intensity of

perceived pain. For each painful area identified, the patient was given a 10 cm line and asked to draw on the line the intensity of pain he or she was feeling the left end of the line represented "no pain at all" and the right end of the line represented the "worst pain you can imagine". The patient's mark on the line was measured (in cm) with a ruler. The VAS is a reliable and valid tool for the quantification of perceived pain. The session of TENS treatment is 2 time / day with a duration of 20 minutes and whole treatment time is 3 weeks.

### Control group (Placebo TENS):

The above positioning of electrodes, pain assessment chart, duration and time period is same as the experimental group. Here the frequency is maintained – 0, Pulse width is 0 and intensity is – 0, duration is 20 minutes 2 sessions/day.

## RESULTS

The Experimental group (N=15) used TENS, the mean of Pre-treatment VAS Score is 8.46 and Post-treatment VAS Score is 2.6.

The Statistical data is analyzed by using Wilcoxon signed-ranks test i.e. P value < 0.05, and the T value 7, which represent the Significance of TENS, and checked with Wilcoxon Probability table i.e. one failed for N=14 the obtained values are.

.05	.25	.01	.005
2.6	21	16	13
7	7	7	7

When Compare with Wicoxon Probability Values (T=7, N=4) the TENS is significant on neuropathic pain in diabetic neuropathy patients.

In Controlled group (Placebo TENS) (N=5), the mean of Pre treatment VAS Score is 7.466, and Post – treatment VAS score is 8.26, The T=78 (N=12) which can be observed in Wilcoxon Probability table.

	0.05	0.25	0.01	0.005
N=12	17	14	10	7
T=78	78	78	78	78

T value were compared Pd"0.05 is not Significant When Compared the TENS (T=7, N=14) with Placebo TENS (T=78, N=12), TENS is significant effect in decreasing the intensity of pain.

## DISCUSSION

There are 2 potential mechanisms by which High – Frequency TENS can relieve the pain of diabetic neuropathy. It is possible that TENS alleviates pain by directly blocking abnormal spontaneous activity in small diameter pain mediating peripheral nerves. This mechanism requires electrical stimulation to be applied directly to spontaneously active nerve. In addition TENS can relieve the pain of diabetic neuropathy by altering nociceptive transmission in the dorsal horn of spinal cord. The second mechanism requires that stimulation be delivered to spinal cord segments that innervate the painful area.

David L Somers and Martha F Somers in his case report, suggest the use of TENS may be an effective treatment for the pain of diabetic neuropathy. In experimental [TENS] Group-A [N = 14] the 8th and 13th subject it is observed that the intensity of pain is increased moderately to severe. The reason is that, these patients are not under stable glycemic control.

In controlled [Placebo TENS] Group-B (N=12) the subject is decreased the intensity of pain in 1 cm i.e. due to the stable glycemic control.

## CONCLUSION

Patients with Diabetic neuropathic pain have shown significant improvement in the decreased intensity of the pain after treating with TENS and Placebo TENS In both the groups. But this improvement was seen more in patients (Group-A) receiving TENS. Improvement in decreased pain as seen on VAS score used for assessing.

TENS has shown a significant improvement on neuropathic pain in diabetic neuropathy patients when compare to the Placebo TENS and hence alternate Hypothesis is accepted Null Hypothesis is rejected.

**Conflicts of interest:** None

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**cite this article:**

Shahanawaz.SD. EFFECT OF HIGH TENS ON NEUROPATHIC PAIN IN DIABETIC NEUROPATHY PATIENTS. *Int J Physiother Res* 2014;2(4):604-607.