

COMPARISON OF EFFICACY BETWEEN TENS AND IFC IN TREATMENT OF TRIGEMINAL NEURALGIA

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ABSTRACT

TN occurs more frequently in second and third division of trigeminal nerve, so deep and limited to the territory of trigeminal distribution. The attacks are accompanied by salivation, lacrimation, rhinorrhea, nasal mucosa congestion, skin redness, facial swelling and/or contraction of the muscles acting on jaw. It is also characterized by regions of increased arousal, called trigger zones. There is gamut of medical and surgical treatment modalities available for trigeminal neuralgia, with other treatment methods like physiotherapy, acupuncture and psychological methods.⁵ To control pain in patients with TN, carbamazepine should be offered and oxcarbazepine, baclofen, lamotrigine and pimozone may be considered.⁶ Physiotherapy is one of the methods to treat TN, pain control is usually achieved by means of electrical stimulation. The two currents most often used to achieve this intention are pulsed current usually referred as transcutaneous electrical nerve stimulation (TENS) and burst modulated medium frequency alternating current in the form of interferential current (IFC).

Efficacy of TENS and IFC on Trigeminal Neuralgia have been studied separately but studies on comparison are not available. So present study was taken up with the purpose of comparing efficacy of TENS and IFC on trigeminal neuralgia

Both TENS and IFC has significant efficacy in case of Trigeminal Neuralgia when studied separately. But in comparative study between efficacy of TENS and IFC in Case of Trigeminal Neuralgia, TENS was found to be better option over IFC.

KEYWORDS: TENS; IFC; Trigeminal Neuralgia

INTRODUCTION

The incidence of trigeminal neuralgia (TN) is 4.3 percent per 100,000 persons every year, with slightly higher incidence among women¹. TN is defined by IASP as “sudden, usually unilateral severe, brief, stabbing, recurrent pain in the distribution of one or more branches of fifth cranial nerve”². TN occurs more frequently in second and third division of trigeminal nerve, so deep and limited to the territory of trigeminal distribution. The attacks are accompanied by salivation, lacrimation, rhinorrhea, nasal mucosa congestion, skin redness, facial swelling and/or contraction of the muscles acting on jaw. It is also characterized by regions of increased arousal, called trigger zones³. Detailed clinical history, neurological examination and finding of trigger zones verifies diagnosis of Trigeminal neuralgia⁴. There is gamut of medical and surgical treatment modalities available for trigeminal neuralgia, with other treatment methods like physiotherapy, acupuncture and psychological methods⁵. To control pain in patients with TN, carbamazepine should be offered and oxcarbazepine, baclofen¹, amotrigine and pimozone may be considered. For patients with TN refractory to medical therapy early surgical therapy, percutaneous procedures on Gasserian ganglion, gamma knife and micro vascular decompression⁶. Physiotherapy is one of the

methods to treat TN, pain control is usually achieved by means of electrical stimulation. The two currents most often used to achieve this intention are pulsed current usually referred as transcutaneous electrical nerve stimulation (TENS) and burst modulated medium frequency alternating current in the form of interferential current (IFC)^{7,8}. TENS and IFC are forms of electro analgesia based on gate control theory of pain perception. According to this theory, stimulation of large diameter primary sensory afferent cutaneous fibers activates inhibitory interneurons in spinal cord dorsal horn and thus may ease the transmission of nociceptive signals from small diameter A delta and C fibers⁹. TENS is an effective, easy to use and with minimal side effects in patients suffering from trigeminal neuralgia not responding to conventional therapy¹⁰. Studies have shown that IFC is more effective than medication for reducing pain in Trigeminal Neuralgia¹¹. If both TENS and IFC are effective in inducing hypoalgesia, it is much more demanding to evaluate whether one is better than the other¹². The present study is taken up with the purpose of comparing the efficacy of TENS and IFC in treatment of Trigeminal Neuralgia.

METHODOLOGY

Present study is a different subject design conducted on a group of thirty female subjects diagnosed with case of Trigeminal Neuralgia, between the age group of 30-50 years

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with mean age of 39.2. The selection was done on random basis. The sample was then randomly divided into equal groups of 15 subjects each, into Group A (on which TENS was applied) and Group B (on which IFC was applied). Subjects with cardiac pacemakers, skin allergies, mental confusions and lack of skin sensations formed the exclusion criteria in selecting the subjects. Both Group A and Group B were treated with TENS and IFC respectively, with placement of electrode just before the ear and other one at the end of respective nerve. Group A was assigned with electrical stimulation with TENS in continuous mode with pulse duration of $< 150 \mu s$ and frequency of > 80 Hz for 30 min duration with intensity depending upon subject's tolerance for 6 days a week for three weeks and outcome of functional status was recorded by means of visual analogue scale (VAS) at 0 week and 3rd week. Whereas Group B was assigned with electrical stimulation with IFC as bipolar method with pulse duration of $250 \mu s$ and frequency of machine circuit interference of frequency between 4000 Hz with 4100 Hz with beat frequency of 100bps for 30 min duration with intensity depending upon subject's tolerance for 6 days a week for three weeks and outcome of functional status was recorded by means of visual analogue scale (VAS) at 0 week and 3rd week.

RESULTS

Within group comparison between Group A and Group B for Vas score was done by Wilcoxon Signed Rank Test. In both groups there was significant difference in VAS score between 0 week and 3rd week with p value of < 0.01 . There is significant reduction in VAS. Mann Whitney U Test was performed for comparison of VAS between Group A and Group B. These tests were performed among pretest value at 0 week and posttest value at 3rd week. Comparison of VAS of both the groups was done. There was no significant difference between VAS score between pretest value at 0 week but at 3rd week there was significant difference in VAS score of both the groups with $p < 0.01$. Whereas Group A showed highly significant improvement then Group B with U value of 33.5 and p value < 0.01 .

Table 1: Intra Group Comparison of Visual Analogue Scale between Group A and Group B with Mann-Whitney U Test

	Group A	Group B	Combined A and B
Sum of Ranks	311.5	153.5	465
Mean of Ranks	20.77	10.23	15.5
Expected sum of Ranks	232.5	232.5	-
Expected mean of Ranks	15.5	15.5	-

Standard deviation	0.84515	1.12546	24.1091
U-Value	33.5	191.5	-

For Group A, U value is 33.5. The critical value of U at $p < 0.01$ is 56. Therefore the result is significant at $p < 0.01$.

The Z score is 3.25603. The p value is .00056. The result is significant at $p < 0.01$.

Table 2: Inter Group Comparison of Visual Analogue Scale with in Group A Using Wilcoxon Signed Rank Test

W-value	0
Mean Difference	7.4
Sum of Positive Ranks	120
Sum of Negative Ranks	0
Z-value	-3.4078
Mean(W)	60
Standard Deviation	17.61
Sample Size	15

Z-Value is -3.4078. The p-value is 0.00032. The result is significant at $p \leq 0.01$.

W-Value is 0. The critical value of W for $N=15$ at $p \leq 0.01$ is 19. Therefore result is significant at $p \leq 0.01$.

Table 3: Inter Group Comparison of Visual Analogue Scale within Group B Using Wilcoxon Signed Rank Test

W-value	0
Mean Difference	5.4
Sum of Positive Ranks	120
Sum of Negative Ranks	0
Z-value	-3.4078
Mean(W)	60
Standard Deviation	17.61
Sample Size	15

Z-Value is -3.4078. The p-value is 0.00032. The result is significant at $p \leq 0.01$.

W-Value is 0. The critical value of W for $N=15$ at $p \leq 0.01$ is 19. Therefore result is significant at $p \leq 0.01$.

DISCUSSION

Efficacy of TENS and IFC on Trigeminal Neuralgia have been studied separately but studies on comparison are not available. So present study was taken up with the purpose of comparing efficacy of TENS and IFC on trigeminal neuralgia, the result of the study for inter group comparison of VAS with in Group A show significant decrease in Vas value from 0 to 3rd week which indicates towards the efficacy of TENS in treatment of Trigeminal Neuralgia which is well supported by study of Singla et.al. on 30 patients with trigeminal neuralgia who were given continuous burst of current for 20 minutes daily for 20-40 days over the path of affected nerve with portable TENS machine. Patients were subsequently evaluated at 1 and 3 months interval for pain by VAS, VPS and functional outcome scale which showed significant decrease in pain¹³. Similar results were reported in a case of 36 year old man that

showed immediate and long term remission of symptoms when intense discharge of TENS was delivered accidentally. Hence thought that TENS at an intense level may result in long lasting effects¹⁴. The results of laboratory studies suggest that electrical stimulation delivered by a TENS unit reduces pain through nociceptive inhibition at presynaptic level in dorsal horn thus limiting the central transmission, thus helps in treating variety of medical conditions like neurogenic pain, post herpetic neuralgia, trigeminal neuralgia, brachial plexus avulsion¹⁵. Significant results were found in present study for inter group comparison of VAS in Group B treated with IFC, Soomro et.al. Illustrated the effect of IFT on reducing pain for patients with trigeminal neuralgia by having them received 15 sessions of IFT with treatment duration of 30 min. The intensity of impulse varied according to patient's tolerance. The result suggested that IFT could be considered as one of the physical modalities in reducing pain for trigeminal neuralgia¹¹. Another study on 49 patients suffering from post-herpetic neuralgia conclude that interferential current and narrow band UV B were effective in acute and sub-acute neuralgia, while only interferential is effective in established neuralgia¹⁶. The efficacy of IFC in Trigeminal Neuralgia can be attributed to the fact that IFC is a medium frequency current that exerts lower resistance to the skin than TENS. This could be due to the stronger penetration power of IFC. Therefore IFC is likely to be more effective in penetrating through skin and stimulating the deep nerve tissue underneath¹⁷. Studies have shown that IFC is an afferent stimulation applied to skin, its analgesic mechanism involves gate control theory, the physiological block and the endogenous pain inhibitory system similar to that of TENS¹⁸. The results of the study for intra group comparison for VAS score between group A and Group B show highly significant improvement in Group A than in Group B can be explained by study of Shanahan et.al which found that TENS was significantly more effective than premodulated IFC in elevating pain threshold¹⁹. It is unknown whether the analgesic effect of IFC is superior to concomitant interventions. IFC alone was not significantly better than placebo or other therapy at discharge or follow up²⁰. Balance of evidence suggest that IFC is also an effective electrotherapeutic treatment for pain management, but the evidence are less strong than that for TENS. TENS was shown to be more adaptable method of stimulating the nerve pathways than IFC²¹. The evidence suggest that both TENS and IFC has significant analgesic efficacy but comparative study show that TENS has better analgesic efficacy in treatment of Trigeminal Neuralgia than IFC. However there

has been very little research into the comparative effectiveness of TENS and IFC in case of Trigeminal Neuralgia which makes it much more demanding to evaluate which one is better than other and requires further study to find out difference in efficacy of TENS and IFC in case of Trigeminal Neuralgia.

CONCLUSION

Both TENS and IFC has significant efficacy in case of Trigeminal Neuralgia when studied separately. But in comparative study between efficacy of TENS and IFC in Case of Trigeminal Neuralgia, TENS was found to be better option over IFC.

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