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RESEARCH ARTICLE OPEN ACCESS

EFFECTIVENESS OF TENS VERSUS MICROCURRENT IN PATIENTS WITH CERVICAL RADICULOPATHY

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ABSTRACT

Background: Cervical radiculopathy is a dysfunction of nerve root of the cervical spine where C6 & C7 nerve roots are the most commonly affected. It encompasses important symptoms other than pain, such as paraesthesia, numbness and muscle weakness in dermatomal or myotomal distribution of an affected nerve root. A multitude of physical therapy interventions have been proposed to be effective in the management of cervical radiculopathy, including micro current, manipulation, therapeutic exercises and TENS. Studies to find out the effectiveness of TENS versus Micro current among patients with Cervical Radiculopathy are scarce.Hence the present study was undertaken to find out and compare the effectiveness of TENS versus Micro Current Therapy a newer technique towards betterment in treatment of cervical radiculopathy patients. **Methodology**: 30 patients from Swarnagiri Physiotherapy & Neuro Psychiatric rehab centre., Kota Rajasthan, and 10 from government hospital Kota Rajasthan were chosen based on the inclusion and exclusion criteria. Group A comprised of 20 people with cervical radiculopathy were given TENS with Isometric neck exercises and active neck movements. Group B comprised of 20 people with cervical radiculopathy were given Micro Current Therapy with Isometric neck exercise and active neck movements. VAS Scale & Neck Disability Index (NDI) were used as outcome measures pre & post treatment. **Results**: The pre - test evaluation showed that, there is no significant difference (P> 0.05) between the two groups for all the variables measured. The post-test evaluation of both groups showed a very high significance (P< 0.05) within the group for all the outcome measurements. A post-test comparison of measured variables, between the groups showed that the Group B demonstrated a statistically significant (P< 0.05) reduction in pain and Neck Disability Index. **Conclusion:** From the above study concluded that Micro current was more effective in the management of cervical radiculopathy along with isometric neck exercise, in reducing both neck & arm pain, neck disability & in improving activities of daily living.

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INTRODUCTION

Cervical radiculopathy is a dysfunction of nerve root of the cervical spine where C6& C7 nerve root s are the most commonly affected. In the younger population, it is a result of a disc herniation or an acute injury causing foramina impingement of an existing nerve whereas in older patients, cervical radiculopathy is often a result of foramina narrowing from osteophyte formation, decreased disc height, degenerative changes of the uncovertebral joints anteriorly & of the facet joints posteriorly. It encompasses important symptoms other than pain, such as paraesthesia, numbness and muscle weakness in dermatomal or myotomal distribution of an affected nerve root. Although patients with cervical radiculopathy may have complaints of neck pain, the most frequent reason for seeking medical assistance is arm pain. The Preferred management of cervical radiculopathy is non-operative, and various noninvasive interventions have been used with mixed results.The first aim of this study was to evaluate the therapeutic effects of micro current electrical neuromuscular stimulation onNeck & Arm pain complications of cervical Radiculopathy. A mass profusion of physical therapy intervention has been proposed to be effective in the management of cervical radiculopathy, including mechanical cervical tract ion, manipulation, therapeutic exercises TENS and Micro current. Microcurrent therapy is a form of treatment used for patients with soft tissue injuries and chronic pain. Similar to electrical stimulation therapy, electrodes are placed on the skin over the affected tissue. Unlike electrical muscle

stimulation, the micro currents are very small. Microcurrent therapy restores the electromagnetic field within your body so that the cells are back up to normal function. This speeds up healing. Microcurrent therapy has been shown to decrease pain, inflammation, and muscle spasms. It may also help with range of motion.In choosing a micro current device, the most critical aspect is the waveform. Specific waveform attributes are essential to achieving good results. micro current has current levels less than one milliampere. using a variable maximum frequency of 0.5 Hz (0 to 2 second pulses) in a complex 10 second bipolar waveform with a control device. Mechanism states that weak stimuli excite physiological activity, moderate stimuli favour it, strong stimuli retard it, and very strong stimuli arrests it.3 Chang found that 500 microamperes caused adenosine triphosphate (ATP) to increase by 500% while raising the current over 5 milliamperes caused ATP to drop below baseline norms. Further, at 100-500 microamperes, amino acid transport rose 30-40% above controls.4 TENS stands for Transcutaneous Electrical Nerve Stimulation used to treat pain. Pain control TENS unit's t ypically produce a continuous train of pulsed current at frequencies in the range 1 to 120Hz, some as high as 200Hz. The pulses are normally rectangular, or close to rectangular, in shape, biphasic & the pulse duration is normally 50-200us The aim is selectively to excite A-B(beta) [sensory] nerve fibers & produce an analgesic effect by 'gating' signals conveyed by pain {A-S(delta) & C} fibers. High rate TENS optimally stimulates A-B (beta) fibers, not because of its higher frequency but small pulse width. The short pulse duration results in preferential recruitment of the largest diameter nerve fibers. Pain relief has a rapid onset & the stimulation can be used for extended periods of time in a day and for a longer period. Low rate TENS is assumed by some to optimize the production of encephalin & endorphins. Brief intense TENS has a rapid induction & is used for more intense pain, such as prior to or following a painful local procedure. Hence the present study was undertaken with an intent ion to find out and compare effectiveness of Micro current versus TENS a newer technique towards betterment in treatment of cervical radiculopathy patients.

Need for the Study: Micro current therapy (MCT) is a novel treatment for pain syndromes. The MCT patch is hypothesized to produce stimuli that promote tissue healing by facilitating physiologic currents. Solid evidence from randomized clinical trials is lacking. To evaluate the efficacy of MCT in treating aspecific, chronic Neck pain& Arm Pain.

Hypothesis

Alternative hypothesis: Effectiveness of Tensover micro current will impose a positive impact on Neck & Arm pain complications in Patient with cervical Radiculopathy.

Null hypothesis: Effectiveness of Tensover micro current will have no significant effect on Neck & Arm pain complications in Patient with cervical Radiculopathy.

MATERIAL AND METHODOLOGY

Study Setting- The research will be executed in the Swarnagiri Physiotherapy & Neuro Psychiatric rehab centre, and from government hospital Kota Rajasthan.

Study Design and Sample Size: In this Prospective study clinical Trial. The number of subjects enrolled in the experimental study will be 40 (n=40).

Sample Size Calculation: For calculation of sample size paired t test will be used with 20 subjects in each group.

: To calculate the sample size, the technique of estimation of sample size for paired t test will be used.

$n = [(Z1-\alpha /2+ Z1-\beta)^2]/ \sigma^2 + (Z1-\alpha/2)^2/2$ Where α is the level of significance (5%),1-β is the power (80%) and σ is the effective size (0.5), lost to follow up (20%) $n= (1.96+0.84)^2/0.5^2 + (1.96)^2/2$ n=33 Sample size is 40 with 20% lost to follow up.

Sample Size 40.

Method of data collection: 30 patients from Swarnagiri Physiotherapy & Neuro Psychiatric rehab centre., Kota Rajasthan, and 10 from government hospital Kota Rajasthan were chosen based on the inclusion and exclusion criteria. Patients were explained about the study. Subjects within the age groups of 20 –60 to 12 years of either gender having stiffness neck pain & arm pain with muscle weakness, NDI level I to III and VAS score slightly toward higher pain intensity or persons who are not able to perform their ADL independently.

Inclusion criteria

1. Both the sexes between age group 20 to 60 years were taken (as they can understand the commands of the therapist)
2. Symptoms positive to cervical radiculopathy
3. Patients showing positive cervical compression test, manual cervical distraction test,
4. Symptoms limited to lower cervical spine (C 5, 6, 7)

Exclusion criteria

1. Cervical instability
2. Cord compression
3. Spinal tumors
4. Spinal infections
5. Previous spinal injury
6. Recent motor or vehicle accident involving cervical spine
7. Systemic disease
8. Severe osteoporosis
9. History of psychological or physical illness

Study design: prospective longitudinal interventional study.

Participant Timeline-The duration of study is 1 year and that of intervention is 4 weeks so participants will be enrolled during first 11 months of study so 4- week intervention will be completed successfully. Assessment will be taken on 1st day by using NDI, VAS and Neck movements.

Intervention Design - 40 subjects with Cervical Radiculopathy will be selected from the Physiotherapy OPD of Career Point University and segregated in two different groups

Group A- Intervention group
Group B- Comparator group

Interventions Group A comprised of 20 people with cervical radiculopathy given TENS with Isometric neck exercises and active neck movements.

TENS parameters:

Frequency: 5 Hz
Intensity: high Pulse
duration: 300 Micro sec.
Duration: 20 minutes, 4 sessions/ week. (up to 4weeks)
Electrode placement: Area of greatest intensity of pain

Comparator Group B comprised of 20 people with cervical radiculopathy were given Micro current with Isometric neck exercise and active neck movements.

Micro current parameters: primarily monophasic waveform of average amplitude 40 microamps, 1 hr daily for 3 weeks

Duration: 1Hr once a day 4 session/week. (up to 4 wks.)
Patient position: supine lying

Samples size: 25 subjects
Study duration: The total duration of the study is 3weeks.
Outcome measures: VAS Scale, Neck Disability Index

Implementation: Participants will be asked to manually select the envelope, sealed group allocation for the recruitment into either group.

Blinding: While assigning the subjects to the group the assessor will be blinded. To ensure blinding subjects will be mandated not to reveal any details of their treatment to the assessor.

Sample Size Consideration This Prospective Clinical Trial is an experimental two group design which is evaluating the Effectiveness of TENS on neck and arm pain with neck movements in the cervical radiculopathy Total 40 subjects will be taken and then after they will be randomized.

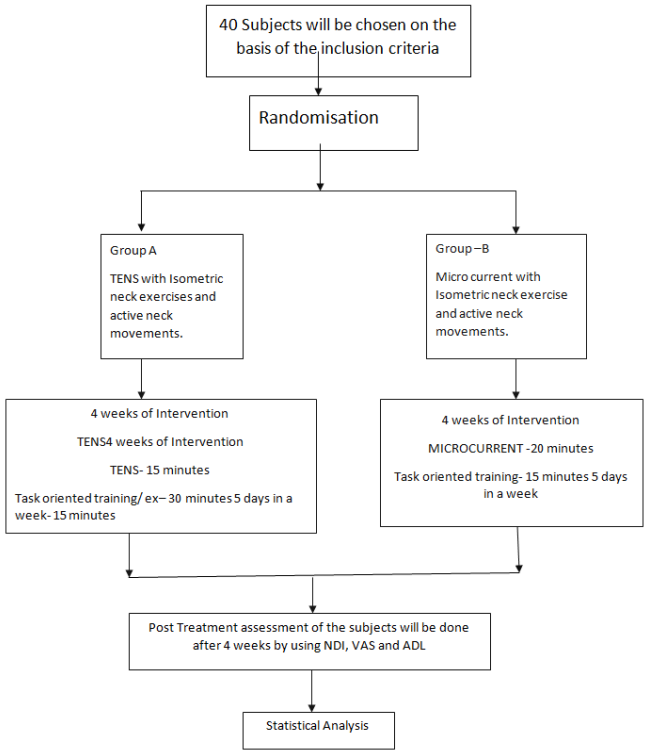

Fig. 1. Schematic diagram of sample analysis

Post assessment of the subjects will be recorded by using the same outcome measures (NDI, VAS and ADL) at the end of the treatment or after the intervention. The baseline assessment of the subjects will be done by using Neck Disability Index (NDI), Visual Analogue Scale (VAS) which will measure the ROM, Disability & Pain in the Cervical Radiculopathy. The time duration of treatment for group B will be of 20 minutes, 5days per week for 4 weeks. Post assessment of the subjects will be done by using NDI, ADL parameters and VAS which are mentioned above in the baseline or Pre assessment of the subjects after the intervention.

Outcome Measures

Neck Disability Index (NDI): This questionnaire has been designed to give the doctor information as to how your neck pain has affected your ability to manage in everyday life.Howard Vernon developed the neck disability index (NDI) in 1989. The NDI was developed as a modification of the Oswestry low back pain disability index with the permission of the original author (J. Fairbank, 1980). In 1991, Vernon and Mior published the results of a study of reliability and validity in the Journal of Manipulative and Physiologic Therapeutics. Since then, approximately ten articles have appeared in the indexed literature on the NDI.The NDI has become a standard instrument for measuring self-rated disability due to neck pain and is used by both clinicians and researchers. Each of the 10 items scores from 0 to 5. The maximum score is 50. The obtained score can be multiplied by two to produce a percentage score. Occasionally, a respondent will not complete one question or another. The average of all other items is then added to the completed items. The original report provided scoring intervals for interpretation, as follows: 0 to 4 = no disability 5 to 14 = mild 15 to 24 = moderate 25 to 34 = severe Above 34 = complete The means 15 – 24 out of 50 (the RAW SCORE) equates with moderate disability.

Visual Analogue Scale (VAS): A Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured.[15] It is often used in epidemiologic and clinical research to measure the intensity or frequency of various symptoms.[16] For example, the amount of pain that a patient feels ranges across a continuum from none to an extreme amount of pain.[15] From the patient's perspective, this spectrum appears continuous ± their pain does not take discrete jumps, as a categorization of none, mild, moderate and severe would suggest. It was to capture this idea of an underlying continuum that the VAS was devised.[16] A visual analogue scale (VAS) usually consists of a 100 mm line anchored at each end by descriptors (Fig. 13.4). Patients place a mark on the scale that corresponds to their pain. The distance (usually in mm) from the lower end of the scale is then measured and recorded.

ADL Parameters

Group B: Group B will receive Micro Current & Task Oriented Exercises for upper extremities which will include Active neck movements, isometrics exercises, along with functional Activity.

Data Collection and Management: The data of the subjects will be collected prior to the treatment (Pre-treatment) and after the intervention or treatment by using Neck Disability Index, Visual Analogue Scale andADL Parameters.

Statistical Analysis: To find out the impact of micro current on Cervical radiculopathy in patient withNeck Pain paired t test will be used but if the data does not follow a normal distribution then Wilcoxon sign rank test will be used.

DISCUSSION

The purpose of this Prospective Randomized Clinical Trial Research study is to evaluate the Potency of Tens & micro current onNeck Pain and ADL Parameters in patient havingCervical Radiculopathy. This study will also provide a literature concerning the impact of Tens & micro current on Neck Pain and ADL Parameters in patient having Cervical Radiculopathy. Some researchers have proved that TENS have a good and positive impact on improvingboth neck & arm pain, neck disability & in improving activities of daily living in patient having Cervical Radiculopathy. **Conclusion:** The conclusion of this research is to acquire the fruitfulness of Approaches of TENS along with isometric neck exercise&active neck movements on improving both neck & arm pain, neck disability & in improving activities of daily living in patient having Cervical Radiculopathy.

Confidentiality: The study program will be explained to the participant; the Investigator will record the subjective information. The consent form will include the confidentiality statement and signatures of the investigator, patient and witnesses. If required to disclose some information for the study, consent will be taken from the patient with complete assurance of his confidentiality.

Future Scope of the Study: TENS can be an effective modality in cervical Radiculopathy to improve both neck & arm pain, neck disability &also activities of daily living.

Implication of the Study: If the study is proved to be effective, then training and enhancing the Cervical Radiculopathy will be an active ingredient in treatment of Patient with cervical Radiculopathy.

Competing Interests: Authors have declared that no competing interests exist.

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