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Effect of high transcutaneous electrical nerve stimulation on pain and chest expansion in subjects with intercostal drain tube: A quasi-experimental study

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Abstract
Background: Conventional TENS that is high frequency low intensity generate nerve impulse in large diameter non-noxious afferents (A-ß) arising from mechanoreceptors. This study aimed to find the effect of high transcutaneous electrical nerve stimulation on pain and chest expansion in subjects with intercostal drainage tube. Thoracotomy can be one of the most painful types of incision that patient can experience. Pain may inhibit effective coughing, deep breathing and upper limb mobilization of affected side [3]. Intercostal Chest drains (ICD) are painful as the parietal pleura are very sensitive to pain. Hypoventilation occurs because of pain and muscle guarding at ICD site. Therefore, it is important to emphasize on pain relief and expansion. The Numeric Pain Rating Scale (NPRS) that is a one-dimensional measure of pain intensity in adults. The NPRS is a valid and reliable scale to measure pain intensity (r= 0.95 & 0.96). Chest expansion is measured using measuring inch tape. Measuring the circumference of chest at axillary, nipple, and xiphoid level. Chest expansion at axillary, nipple and xiphoid level [intra-rater upper chest icc value = 0.90-0.93 for lower chest 0.85-0.86 (very good agreement) inter-rater value for upper chest 0.73-0.83 for lower chest 0.82-83 (good to very good)]
Material and methodology: Subjects with intercostal drain tube (n=22) were selected in this study. Total 22 subjects were selected with age group 40-60 years based on inclusion and exclusion criteria with their consent were selected in this study. TENS was applied for 7 days, and NPRS score was used to assess pain and chest expansion was assessed pre and post treatment intervention.
Result: TENS showed significant effect in reducing pain and improving chest expansion assessed using NPRS and chest expansion respectively. The p value for NPRS pre and post intervention is 0.01, and chest expansion at nipple and xiphoid level pre and post intervention is 0.01.
Conclusion: According to the result, our study proves the alternate hypothesis. TENS is effective in reducing the acute pain after insertion of ICDT and hence improving chest expansion. Therefore TENS can be helpful clinically to alleviate post ICDT insertion pain.

Keywords: high transcutaneous electrical nerve stimulation, NPRS, chest expansion, intercostal drain tube

Introduction

Chest drains are also referred as under water sealed drainage, thoracic catheter or intercostal drainage. ICD are inserted as in invasive procedure to remove fluid, air from pleural space or mediastinum or re-expand the lung and restore negative intrapleural pressure and respiratory function. Conditions like pleural effusion, pneumothorax, haemothorax, and empyema, post cardiac or thoracic surgery require chest drainage [1]. The accumulation of pleural effusion has important effects on respiratory system function. It changes the elastic equilibrium volumes of the lung and chest wall, resulting in a restrictive ventilatory effect, chest wall expansion and reduced efficiency of the inspiratory muscles [2]. Thoracotomy can be one of the most painful types of incision that patient can experience. Pain may inhibit effective coughing, deep breathing and upper limb mobilization of affected side [3]. Intercostal Chest drains (ICD) are painful as the parietal pleura are very sensitive to pain. Hypoventilation occurs because of pain and muscle guarding at ICD site. Therefore, it is important to emphasize on pain relief and expansion [4]. TENS is a popularised name of transcutaneous electrical nerve stimulation produced by a portable stimulator. By definition, it covers the complete range of transcutaneous applied currents used for nerve excitation. It is a simple non-invasive analgesic technique used for symptomatic management of pain. Pain control TENS unit typically produce a continuous train of pulsed current at frequencies ranging from 1-120Hz to selectively excite A beta fibres and produce analgesic effect to reduce pain conveyed by A delta and c fibre [3].Conventional TENS that is high frequency low intensity generate nerve impulse in large diameter non-noxious afferents(A-ß) arising from mechanoreceptors [5].
The Numeric Pain Rating Scale (NPRS) that is a one-dimensional measure of pain intensity in adults, in which a respondent selects a whole number (0–10 integers) that best reflects the intensity of his/her pain. The NPRS takes <1 minute to complete. The NPRS is easy to administer and score Minimal language translation difficulties supports the use of the NPRS across cultures and languages. The NPRS is a valid and reliable scale to measure pain intensity (r= 0.95 & 0.96) [6].

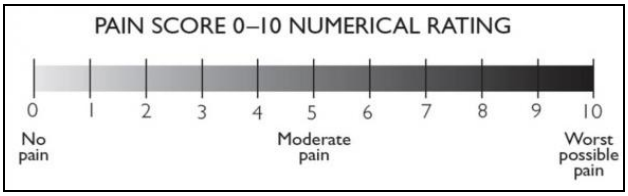

Fig 1

Chest expansion is measured using measuring inch tape. Measuring the circumference of chest at axillary, nipple, and xiphoid level. Chest expansion at axillary, nipple and xiphoid level [intra-rater upper chest icc value = 0.90-0.93 for lower chest 0.85-0.86 (very good agreement) inter-rater value for upper chest 0.73-0.83 for lower chest 0.82-83 (good to very good)] [7]

Material and Methodology

Material

1. TENS portable machine
2. Numerical pain rating scale
3. Measuring inch tape

Methodology

1. Type of study- quasi- Experimental study.
2. Study setting – tertiary care unit in Miraj
3. Sample size- 22
4. Type of sampling- purposive sampling.
5. Duration of the study- six months.

Conclusion

According to the result, our study proves the alternate hypothesis.

TENS is effective in reducing the acute pain after insertion of ICDT and hence improving chest expansion. Therefore TENS can be helpful clinically to alleviate post ICDT insertion pain.

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