# Evaluating the Effectiveness of Attention Distraction Method on Perception of Pain During the Use of Myofascial Trigger Point Release Technique

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**Background:** Distraction techniques are identified as cognitive processes that interfere with pain perception by preventing transmission of pain signals to the brain. The focus of these techniques is to direct the attention of the patient to a different stimulus other than the pain sensation. Dry needling (DN) is a mildly invasive technique which is used to treat pain associated with Myofacial trigger points (MTrPs). Even though previous studies have evaluated the influence of distraction techniques on the pain perception during various interventions, the effects during DN are not available in literature.

**Objectives:** This study evaluated the influence of distraction technique on the perception of pain during MTrP-DN technique and also the influence of age and gender on the differences of pain perception.

**Methods:** Sixty patients with non-specific neck pain were randomly assigned to either the control or interventional groups. Only DN was performed for the control group, while patients in the intervention group, were asked to count backwards from 10 to 1 while slowly breathing in and out without letting their attention be distracted during the DN. The level of pain perception was evaluated immediately after DN by using numeric rating scale (NRS). The ethical approval was obtained by the Ethics Committee of the National Hospital, Kandy.

**Results:** A significant difference was noted ($p<0$ 0.05) in NRS pain scores between control and the intervention groups regardless of the gender and the age category.

**Conclusion:** The counting down distraction technique appears to be effective in improving pain perception during DN in the patients with non-specific neck pain.

**Key words:** Dry needling, Pain perception, distraction, attention, myofascial trigger points

## Introduction

Pain can be defined as an unpleasant sensory and emotional experience associated with or resembling associated with actual or potential tissue damage.[1]Myofascial pain syndrome and the associated trigger points (TrPs) are the most prevalent causes of neck and shoulder pain. The upper trapezius is known to bethe most commonly affected skeletal muscle with TrPs.[2] Various invasive and non-invasive therapeutic practices are mentioned in literature for the clinical deactivation of the TrPs. Amongst them, dry needling (DN) is identified as a mildly invasive technique that is commonly used to reduce the pain associated with MTrPs.[3] Patients more commonly fear of medical procedures involving needling and perceive them as painful and besides vasovagal response is one of the possible risks that could be associated with painful procedures such as needling.[4] For these

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reasons, the emphasis should be given to the reduction of the pain during process of needling.

Distraction is a process by which the attention of the patient is directed to another stimulus other than the pain sensation. It is identified that cognitive processes such as distraction techniques could amend the pain perception through descending fibers to the gating system and thereby could prevent the transmission of pain signals to the brain.[5]Previous studies have evaluated the influence of distraction techniques on the pain perception during venipunctures[4,6] and lumbar punctures[7] but to the best of our knowledge, the effects during DN are not available in the literature. Therefore, the objectives of the current study were to evaluate the influence of distraction technique on the perception of pain during MTrP-DN technique and to evaluate the association of age and gender on the differences of pain perception.

## Methodology

This was an experimental study which was carried out in the Department of Physiotherapy, the National Hospital, Kandy from April 2021 to August 2021. The study was approved by the Research and Ethical Review Committee of the National Hospital, Kandy.

### *Subjects*

Subjects referred from the Rheumatology and Orthopedic Clinics to the Department of Physiotherapy were enrolled in the study. The inclusion criteria for the study were; subjects presenting with non-specific neck pain with active upper trapezius TrPs of not more than 12 weeks duration unilaterally or bilaterally. The exclusion criteria were; Subjects presenting with neck pain due to significant trauma, serious pathology (malignancy, fracture, infection), cervical spinal cord injury, recent neck surgery, abnormal bleeding tendency or who are on anticoagulants, subjects who have undergone myofacial pain therapy within the past month, subjects who were not able to comprehend the Sinhala language (Other nationalities) and were fear of needles. An active trigger point (TrP) in the upper trapezius muscle was defined as a tender nodule in a taut band that referred pain in a specific pattern to this muscle beyond the area of contact.[8]

### *Randomization and blinding*

Patients were randomly assigned to one of two groups: control and intervention groups using a computer-generated list of random numbers. Only DN was performed for patients in the control group and the DN procedure was explained by a physical therapist experienced in DN procedure. The distraction technique was introduced for the patients in the intervention group prior to the DN procedure by a separate researcher. Patients were asked to concentrate on the count-down technique while breathing in and out.

“Count from 10 to 1 backwards while breathing in and out slowly. Do not let your attention to distract. Once you have reached the number 1, start counting again from 9 in backward direction and continue as 8-1, 7-1, 6-1, 5……”

During the DN procedure, patients were asked about where they were counting at certain time points to make sure the patient was completely focused on the counting. The aforementioned distraction technique was used because of its simplicity and the capability of immediate application in the clinical set-up. The process of counting backwards is known to require more attention and concentration than counting forward. Counting was integrated with rhythmic breathing which is identified as a component of relaxation.[9] All the subjects were blinded. The outcome measure was assessed by a blinded researcher who was not familiar with the group allocation and procedures.

### *Procedure*

Subjects included were explained about the nature of the study by the language best understood by them (Sinhala). Written informed consents were obtained from the subjects who were willing to participate, and they were duly signed by the subjects. Demographic data was collected at the initial counter. Participants who were enrolled in the study were then screened for the presence of active MTrPs in the upper trapezius muscle according to the protocol described by Simons et al., (1999)[8] and they were marked with a marker by a blinded assessor. The same was investigator involved in assessing the trigger points of all participants.

- Dry needling (DN) technique

For the upper trapezius MTrPs, DN was performed with the patient in the prone position and the neck in the neutral position with a 0.25mm, 25mm gauge sterile acupuncture needle with guided tube. The areas to be needled were sterilized with an alcohol swab prior to the procedure and the gloves were worn by the therapist throughout the procedure. This needle was inserted into the skin in a perpendicular manner over the palpable painful nodule and it was slowly advanced until it reached the trigger point and elicited a local twitch response (LTR). Hong's pistoning technique was used in which the needle was repeatedly withdrawn from the MTrP rapidly and was inserted again into a different site of the MTrP region at a different angle without pulling the needle out of the skin. This was done until no more LTR or pain responses are elicited.[10]Firm compression with cotton was applied immediately after the needle was pulled out of the skin to avoid post-injection soreness, swelling or ecchymosis as described by Hong, (1994).[10]

***Outcome measures***

*Numeric Rating Scale (NRS)*

Data regarding the level of pain was measured by 11-point numerical rating scale (NRS) with 0 representing no pain and 10 representing the worst imaginable pain. The NRS has demonstrated good criterion validity and NRC is recommended for the clinical use due to its simplicity.[11] Further, NRS was found to be more reliable than the VAS.[12] The evaluation was done immediately after the DN technique.

***Statistical analysis***

Data analysis was performed using IBM SPSS 25 package. Between groups change for the pain outcome was determined using the Mann-Whitney U-test and Kruskal-Wallis test since the data showed non-normal distribution. To evaluate the association of gender and age categories on the pain score, Chi square test was used. Significance level was set at $P< 0.05$.

**Results**

Approximately 80 participants were included in the study. Mean age and duration of symptoms with the standard deviations are described below. Majority of the patients were females (65%) and were in the age group of 40-59 years. The descriptive statistics of the variables for the total sample and for the males and females separately are given in the table I.

***Table I.*** *Descriptive statistics for total sample (n= 80) and for males and females*

| | Control (n= 40) | | Intervention (n= 40) | |
|---|---|---|---|---|
| | Mean ± SD | Min- Max | Mean ± SD | Min- Max |
| Age (years) | 51.20 ± 11.63 | 29-75 | 46.68 ± 9.36 | 29-71 |

| | | | | |
|---|---|---|---|---|
| DOS (weeks) | 8.43 ± 2.68 | 4-12 | 6.70 ± 1.34 | 4-9 |

| | Control (n= 40) | | Intervention (n= 40) | |
|---|---|---|---|---|
| | Males (n= 12) | Females (n= 28) | Males (n= 16) | Females (n= 24) |
| | Mean ± SD | Mean ± SD | Mean ± SD | Mean ± SD |
| Age | 50.67 ± 9.60 | 51.43 ± 12.55 | 49.06 ± 7.56 | 45.08 ± 10.22 |
| DOS (weeks) | 8.75 ± 2.60 | 8.29 ± 2.75 | 6.75 ± 1.13 | 6.67 ± 1.50 |

SD= standard deviation, Min= Minimum, Max= Maximum, DOS= Duration of symptoms

Pain scores as measured by NRS in control and intervention groups are described according to the gender and different age categories in Table II.

Mann-Whitney U test was performed to evaluate the difference between the control and interventional pain scores and to compare the control and interventional pain scores based on gender. The results are summarized in the table III. Significant difference was noted between the NRS scores of the control and interventional groups. However, no significant difference was found in control and interventional pain scores between males and females (U= 541.5, p= 0.06).

***Table II.*** *NRS pain scores of the participants according to the age and gender*

| Variable | Control | n | Intervention | n |
|---|---|---|---|---|
| | Mean ± SD | | Mean ± SD | |
| Age (years) | | | | |
| 20-29 | 8 | 1 | 8 | 1 |
| 30-39 | 7.17 ± 1.17 | 6 | 6.00 ± 1.10 | 6 |
| 40-49 | 8.70 ± 0.68 | 10 | 5.33 ± 1.24 | 18 |
| 50-59 | 7.92 ± 1.19 | 13 | 5.33 ± 1.07 | 12 |
| 60-69 | 8.63 ± 1.30 | 8 | 5.00 ± 1.41 | 2 |
| 70- 79 | 9.00 ± 1.41 | 2 | 5 | 1 |
| Gender | | | | |
| Male | 7.67 ± 1.23 | 12 (30%) | 5.31 ± 1.14 | 16 (40%) |
| Female | 8.43 ± 1.10 | 28 (70%) | 5.58 ± 1.25 | 24 (60%) |

SD- Standard deviation

***Table III.*** *The difference between control and interventional pain scores*

| | | n | Mean rank | Mann-Whitney U | P value |
|---|---|---|---|---|---|
| Pain score (NRS) | Control | 40 | 57.91 | 103.5 | P< 0.05 |
| | Intervention | 40 | 16.8323.09 | | |
| | | n | Mean rank | Mann-Whitney U | |
| Pain score (NRS) | Male | 23 | 33.84 | 541.5 | P> 0.05 |
| | Female | 37 | 44.09 | | |

NRS- Numeric Rating Scale

Furthermore, the difference between the control and interventional pain scores was evaluated based on different age categories with Kruskal-Wallis test. The results are summarized in table IV.

***Table IV.*** *The difference between control and interventional pain scores based on different age categories*

| | | n | Mean rank | Chi-square |
|---|---|---|---|---|
| Pain score (NRS) | 20-29 | 2 | 56.00 | 5.99 |
| | 30-39 | 12 | 37.08 | |
| | 40-49 | 28 | 36.86 | |
| | 50-59 | 25 | 38.48 | |
| | 60-69 | 10 | 53.85 | |
| | 70-79 | 3 | 50.17 | |
| NRS- Numeric Rating Scale | | | | p> 0.05 |

Kruskal-Wallis H test showed no statistically significant difference in pain scores among different age categories, $\chi^{2\,(5)} = 5.99$, p= 0.307. Chi-square test was performed to evaluate the association of gender and age category with the control and interventional pain scores separately and the results are shown in table V.

***Table V:*** *The association of gender and age category with the control and interventional pain scores*

| | | Pearson Chi-square Value | df | P value |
|---|---|---|---|---|
| Gender | Control pain score (NRS) | 4.82 | 4 | p> 0.05 |
| | Interventional pain score (NRS) | 2.59 | 4 | |
| Age category | Control pain score (NRS) | 23.16 | 20 | p> 0.05 |
| | Interventional pain score (NRS) | 33.33 | 20 | |

The results indicate no significant difference in relation to gender and age categories between the intervention and control groups.

**Discussion**

DN technique is identified as potentially painful when the needle touches or penetrates the MTrP.

Pain is identified as a negative emotional experience which reduces an individual's attention and cognition, and thereby the quality of life as well. This negative emotional experience itself can hinder the effectiveness of a particular treatment. For these reasons, emphasis should be given to the reduction of pain and fear associated with the needling process. Distraction is a process by which the attention of the patient is directed away from the sensations or emotional reactions produced by the painful stimulus[13] and these techniques are frequently used to reduce the pain experienced by a patient during painful procedures. Cognitive processes such as distraction techniques are known to increase pain tolerance by placing the pain at the periphery of awareness.[14] It is also found that the distraction techniques are increase the levels of endorphins[15] which in turn alter or inhibit the painful stimulus.

The cognitive behavioral methods that are used to distract the patient's attention from the pain stimuli include relaxation, music therapy, imagery and hypnosis.[7,15,16] Additionally, the efficacy of several other distraction methods including attention control methods[17] and visual distraction methods[6] in the modification of pain signals in pain sufferers have also been studied in literature. The intention of these methods is to increase the control over pain by altering the negative behavioral responses that could be associated with pain stimuli.[18]

The results of the present study have demonstrated a significant difference in the perceived pain levels between the control and the intervention groups regardless of the gender and the age category in patients with non-specific neck pain.

This is in agreement with the results obtained by -other studies which used different distraction methods. Blitz & Dinnerstein, (1971) have evaluated the effects of attention control on the pain threshold of a group of volunteers using ice water as the noxious stimulus and have noted a significant increase in pain threshold exhibiting the analgesic effects of redirection of attention.[17]The effectiveness of relaxation and imagery techniques on pain during lumbar puncture was examined by Broome et al., (1994)[7]. The study results have shown significantly decreased pain ratings over time in the patients who practiced cognitive strategies during the procedure. Moreover, the effect of music as a distraction method has been studied by Linnemann, (2015)[19] in a group of adult patients with fibromyalgia. Results have shown the beneficial effects of listening to music on control over pain in chronic pain sufferers.

Further, the efficacy of distraction techniques during venipuncture pain has been studied.[4,6] The effects of visual distraction on pain have been studied by Vessey et al., (1994)[6] where the patients in the experimental group had received a kaleidoscope to look through during venipuncture while the control group had the routine care. Significantly lower pain scores have been obtained in the experimental group. Balany uk et al., (2018) have formulated different questions on different subjects and have applied on a group of patients undergoing venipuncture and have found significant reduction of pain in the distraction group.[4] Furthermore, Sparks et al., (1998) have employed blowing bubbles as the distraction method on a group of children during Diphtheria-Tetanus-Pertussis (DTP) injection and have found significant reduction of self-reported DT injection pain in the distraction group.[20]

Additionally, future studies could be developed to compare and evaluate the effectiveness of several other distraction methods on the perception of pain during DN using large sample sizes.

**Conclusion**

The technique of distraction by counting down appears to be effective in improving pain

perception during DN technique in patients with non-specific neck pain.

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