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Blinded randomized controlled study to evaluate the influence of positive verbal suggestions on the perception of pain during the use of myofascial trigger point dry needling technique

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Abstract

Background: Positive verbal suggestion is identified as a therapeutic element which is used to influence therapeutic outcomes by triggering placebo effects. Dry needling (DN) is a mildly invasive technique used to treat pains associated with Myofacial trigger points (MTrPs). Even though previous studies have evaluated the influence of verbal suggestions on the post dry needling soreness and pain processing after DN technique, the influence of positive verbal suggestions on the procedural pain during DN technique is not available.

Methods: Sixty patients with non-specific neck pain were randomly assigned to either control or interventional groups. For the control group, only DN was performed. For the intervention group, positive verbal suggestion; "You will be given an effective treatment to relieve your pain in the neck. This treatment is soothing and relaxing. You will feel no pain during the intervention" was introduced three times prior to the DN. The level of pain perception was evaluated immediately after the treatment by using numeric rating scale (NRS).

Results: Mean values of NRS pain scores ($p<0$ 0.05) were significantly less in the intervention group compared to control group.

Conclusion: Positive verbal suggestion appears to be effective in improving pain perception during MTrP-DN in the patients with non-specific neck pain.

Keywords: positive verbal suggestion, dry needling, pain perception, expectations, myofacial trigger points

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INTRODUCTION

Patient's expectation towards the pain relief is a substantial predictor in the analgesic treatments [1] where it is found that the expectation of pain relief can directly cause actual pain relief. Three common interventions that are executed to induce expectations in the clinical set up are verbal suggestions, conditioning, and imagery strategies. In particular, these expectation interventions are triggering placebo effects where expectancy is known to be a core mechanism. [2,3] Verbal suggestion is a communication process that conveys information about certain concepts to others and thereby provokes beliefs, expectations, thoughts, emotions, behaviors, or physical states in them consciously or unconsciously [4]. It is known to be a potential therapeutic element which influences the treatment outcomes in the patients who are suffering with pain [4] and the effect of it in pain relief is more frequently studied in literature. This is identified as a concept which alters the patient's perception regarding the pain through hypnotic process.[5] It is also identified as a contextual factor which influences the therapeutic outcome by triggering placebo or nocebo effects.[6] The presence of positive expectations towards a particular treatment is known to be producing a placebo effect while negative anticipations are related to nocebo effect.[7,8] Further, it is found that the combination of positive verbal suggestions with any kind of therapeutic intervention could possibly induce hypoalgesic effects.[9]

Neurobiological involvement of placebo analgesia induced by verbal suggestions have been extensively studied in the literature. When providing positive expectations through verbal suggestions, it is found to be enhancing the neuronal activity in the areas of the brain responsible for memory and semantic processing and thus influencing the areas in the brain responsible for producing analgesia. Also, it is found that the positive verbal suggestions are decreasing the activity of brain regions that process pain [8]. In addition, dorsolateral prefrontal cortex (DLPFC), nucleus accumbens, and dopaminergic systems are known to be playing essential roles in reward learning when expectations are provoked by verbal suggestions [10]. When considering about the biochemical involvement of placebo analgesia, increased release of neurotransmitters such as endogenous opiates, dopamine, and cannabinoids is found with high levels of expectations towards analgesia and thus has resulted in increased levels of analgesia [8].

In everyday clinical practice, many procedures are carried out that cause pain to the patients [11] and it is commonly referred to as procedural pain. Procedural pain is a clinical manifestation of intense episodic pain following a therapeutic intervention. Most of the time, patients commonly fear of medical procedures involving needles and perceive them as painful. Dry needling is identified as a mildly invasive technique used by Physiotherapists to treat the pains associated with Myofascial trigger points (MTrPs) and it is identified as a potentially painful technique when the needle touches or penetrates the MTrP. So that the emphasize should be given to the reduction of pain associated with the needling process since the pain itself can hinder the effectiveness of a particular treatment.

Previous studies have evaluated the influence of verbal suggestions on the post dry needling soreness and pain processing after DN technique over upper trapezius muscle. [12,13] However, to the best of our knowledge, the influence of verbal suggestions on acute procedural pain experienced during the DN technique is not available. Therefore, the objective of this study was to evaluate the influence of positive verbal suggestions on the perception of pain during potentially painful DN technique.

METHODOLOGY

This was an experimental study which was carried out in the Department of Physiotherapy, National Hospital, Kandy during April 2021 to July 2021. The study was approved by the research and ethical review committee of National Hospital, Kandy.

SUBJECTS

Subjects referred from Rheumatology and Orthopaedic clinics to the Department of Physiotherapy were enrolled in the study. The inclusion criteria; subjects presenting with non-specific neck pain with active upper trapezius TrP

of not more than 12 weeks duration unilaterally or bilaterally. The exclusion criteria; 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 Sinhala language (other nationalities) and have 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 for this muscle beyond the area of contact.

RANDOMIZATION AND BLINDING

Patients were randomly assigned to one of two groups: control and intervention groups using a computer-generated list of random numbers. For patients in the control group, only DN was performed explaining the DN procedure by an experienced physical therapist in DN procedure. For the patients in the intervention group, positive verbal suggestion was introduced prior to the DN procedure by a separate researcher.

"You will be given an effective treatment to relieve your pain in the neck. This treatment is soothing and relaxing. You will feel no pain during the intervention"

This positive verbal suggestion was repeated three times prior to the DN technique. All 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 consent was obtained from the subjects who were willing to participate. Demographic data including gender, age and duration of symptoms were collected initially. 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) [14] and they were marked by a marker by a blinded assessor.

- Dry needling (DN) technique

DN was performed by another physical therapist who was experienced with the 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 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 sterile gloves were worn by the therapist throughout the procedure. The 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.[15] 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).[15]

OUTCOME MEASURES

Numeric Rating Scale (NRS)

Data regarding the level of pain was measured by a 11-point NRS with 0 representing no pain and 10 representing the worst imaginable pain. Patients' pain ratings during the DN procedure were used to represent the level of pain. Patient was instructed to rate the pain by asking "Please indicate the intensity of current pain experienced during the procedure on a scale of 0-10". The NRS has demonstrated good criterion validity and it is recommended for the clinical use due to its simplicity.[16] Further, NRS was found to be more reliable than the VAS.[17] The evaluation was done by an assessor who was blinded to the interventions immediately after the DN technique.

STATISTICAL ANALYSIS

Data analysis was performed using IBM SPSS 25 package. Data distribution was assessed using

Shapiro-Wilk test. Accordingly, data was considered as not normally distributed. Therefore, non-parametric tests were used to analyze the data. The Mann-Whitney U-test was done to compare the means of control and interventions.

RESULTS

60 participants were included in the study. Mean age of the patients in the control group was 47.53±12.01 years and that of the intervention group was 46.90 ± 9.62 years. Mean duration of symptoms in the control group was 8.37 ± 2.51 weeks and intervention group was 8.03 ± 2.72 weeks. Majority of the patients were females (70%) and in the age group of 40-59 years (70%). The descriptive statistics of the variables for the total sample are given in the tables I.

Table I. Descriptive statistics for the total sample (n= 60)

	Control (n= 30)		Intervention (n= 30)	
	Males (n= 10)	Females (n= 20)	Males (n= 8)	Females (n= 22)
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age (years)	52.00 ± 9.01	45.30 ± 12.89	48.93 ± 7.87	45.13 ± 10.86
DOS (weeks)	9.10 ± 2.51	8.00 ± 2.49	9.63 ± 2.50	7.45 ± 2.61

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

Pain scores as measured by NRS with only DN (control) and positive verbal suggestions followed

by DN (Intervention) are described according to the gender and different age categories in table II. Mann-Whitney U test was performed to evaluate the difference between control and interventional pain scores. The results are summarized in the table III. Significantly less mean pain NRS pain score was noted in the intervention group compared to the control group (P< 0.05).

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)				
30-39	5.50 ± 0.71	2	3	1
40-49	5.25 ± 0.87	12	2.67 ± 0.71	9
50-59	5.44 ± 0.88	9	2.92 ± 0.67	12
60-69	5.40 ± 0.55	5	3.00 ± 0.63	6
Gender				

Male	5.20 ± 0.92	10 (33.4%)	3.00 ± 0.00	8 (26.7%)
Female	5.45 ± 0.69	20 (66.7%)	2.82 ± 0.73	22 (73.3%)

SD- Standard deviation, MTrP- Myo-facial trigger point

Table III. The difference between control and interventional pain scores

		n	Mean rank	Mann-Whitney U
Pain score (NRS)	Control	30	45.23	8.00
	Intervention	30	15.77	

NRS- Numeric Rating Scale $p< 0.05$

DISCUSSION

This study was done to investigate the effect of positive verbal suggestions on pain relief. Subjects who were presenting with neck pain with active upper trapezius TrPs of not more than 12 weeks duration were selected to have a homogenous sample. The results of the current study demonstrate that the positive verbal suggestions appear to be effective in relieving pain during DN technique.

It is well known that the expectation can have an influence on pain perception [18,19]. Positive verbal suggestions can be used to induce positive expectations towards achieving a particular therapeutic outcome. It is also found that when positive verbal suggestions are combined with professional empathy, it may even increase the analgesic effect while neutral verbal communication combined with low levels of empathy has worsened the treatment outcomes [20,21].

The efficacy of positive verbal suggestions in the management of pain in pain sufferers have been extensively studied in literature.[22-28] Recent studies have evaluated the influence of verbal suggestions (positive, negative and neutral) on the outcomes of DN technique over upper trapezius muscle.[12,13] The results of the study done by Nejad et al., (2020) have indicated similar improvements in perceived pain, pressure-pan threshold (PPT) and neck disability index irrespective of the verbal suggestions given regarding post-needling soreness concluding a negligible influence of positive and negative verbal suggestions towards the effectiveness of MTrP DN technique on treating neck pain.[12] Sánchez Romero et al., (2021) have also studied the effectiveness of verbal suggestion (positive, negative and neutral) on post-needling soreness after DN technique over upper trapezius muscle. This study has concluded no impact of verbal suggestions on post-needling soreness intensity, PPT and sensorimotor variables including temporal summation and conditioned pain modulation.[13] Both studies have focused on the post dry needling soreness and pain where in the current study, the focus was on the reduction of procedural pain. Nejad et al., (2020) have instructed that the treatment could be somewhat painful for their patients in the positive verbal suggestion group.[12] Sánchez Romero et al., (2021) have used a positive statement with regard to the efficacy of the treatment but not regarding the pain relief for the positive verbal suggestion group.[13] However, the current study have exploited the verbal suggestion with regard to both the pain relief and the efficacy of the treatment which may explain why the positive results are obtained.

Some other studies have shown positive outcomes with positive verbal suggestions during high velocity low amplitude thrust manipulation (HVLATM) on cervical and thoracic segments. [29,30]

The objectives of these studies were focused towards the reduction of pain after the procedure, not procedural pain as in the current study. A meta-analysis conducted by Peerdeman et al., (2016) concluded that the verbal suggestions could improve acute procedural pain and chronic pain to a lesser extent accounting for the overall medium-sized effect of the intervention on pain relief [31]. Staats et al., (1998) have also shown significantly increased pain threshold, pain tolerance, and pain endurance in comparison to the control group with positive verbal suggestion [32]. These results are similar to the results of the current study.

On the contrary, the strategy of positive verbal suggestions has shown to be effective & useful in managing pain conditions. Patients have either reported less pain or better treatment outcomes as reported in the literature. This effect is scientifically known as the 'expectation-induced placebo effect'. The 'expectation-induced placebo effect' has been demonstrated not only with verbal suggestions but also with placebo interventions and medications in relation to many disease conditions. Expectations play a central role in the mechanism of the placebo effect. Therefore, the effectiveness of the positive verbal suggestions may be of a placebo type and one does have to be careful when drawing conclusions.

CONCLUSION

Positive verbal suggestions are shown to be efficacious in improving level of perceived pain during DN technique.

Author declaration
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Ethical clearance:
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The authors report no conflicts of interest

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