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Short Communication

Physiotherapy Section

Immediate Effects of Paraspinal Dry Needling in Patients with Acute Facet Joint Lock Induced Wry Neck

SUKUMAR SHANMUGAM[1], LAWRENCE MATHIAS[2]

ABSTRACT

Introduction: Acute facet joint lock induced wry neck (AFJL-WN) is common among adult population and it is primarily managed by medications and physiotherapy. However, the immediate recovery from pain and movements restriction caused by AFJL-WN is not documented in favour of existing interventions.

Aim: To evaluate the immediate effects of paraspinal dry needling (PSDN) on acute neck pain and movement deficit in patients with AFJL-WN.

Materials and Methods: A total of 21 patients with AFJL-WN were treated with single session of PSDN for 12-15 minutes. The Visual Analog Scale (0-100mm) and Hand Held Goniometer were used to assess the immediate, 24 hours and 1 week follow-up neck pain and cervical spine's range of motion respectively. The mean and standard deviation was used to make inferences.

Results: Immediately after PSDN the pain score was reduced and cervical spine range of motion have improved. The 24 hours and 1 week follow-up pain and range of motion scores have shown the sustained improvement without deteriorations.

Conclusion: PSDN is effective method to achieve pain free neck movements in patients with AFJL-WN.

Keywords: Dry needling, Intramuscular stimulation, Torticolis

INTRODUCTION

AFJL-WN can be described as a condition of sudden onset of ipsilateral neck pain and contra-lateral side flexion of cervical spine which is primarily caused by abnormal facet joint articulation [1,2]. The mal-positioned articulating facets may increase the mechanical overloading within the cervical spine's musculoskeletal structures and increase the irritability of nociceptors and inhibit the functions of deep cervical spine's muscles [2]. Traditionally, physicians prescribe analgesics and muscle relaxants, whereas physical therapists advise muscle stretching and other spinal mobilisation techniques to improve the painless cervical spine movements [3-5]. These existing management methods have proved to benefit patients with AFJL-WN; however, we lack evidence for immediate recovery from signs and symptoms of AFJL-WN. To overcome these limitations, Paraspinal Dry Needling (PSDN) may be an alternative therapeutic weapon for achieving immediate sensory-motor modulation [6-9].

Paraspinal dry needling is a deep dry needling approach in which a solid dry needle is inserted into spinal muscles to bring back the normalized sensory-motor function [10]. In fact, a spinal needling technique introduced by Dr. Gunn called as intramuscular stimulation is one of the best examples for the clinical usefulness of PSDN in chronic pain management [11]. Even though dry needling is considered to be an effective intervention tool to manage chronic pain, there is very limited literature evidence on its use in the management of AFJL-WN.

Based on these background evidences, we selected PSDN as a therapeutic tool to achieve immediate effects. Our theoretical background states PSDN in the muscles of dysfunctional facet joint area can stimulate the mechano-receptive spinal segmental and higher cortical neurons which may immediately relieve pain, muscle guarding and improve cervical spine movements [12]. This study evaluated the immediate effects of PSDN in patients who are suffering from acute onset of wry neck caused by facet joint lock.

MATERIALS AND METHODS

This study was conducted during the period between February 2014 and January 2016 in the Department of Physiotherapy and the Department of Orthopaedic Surgery, Justice KS Hegde Charitable Hospital, Mangaluru, India. After screening 34 subjects, 21 healthy adults aged between 18-40 years with the complaints of neck pain and altered neck attitude referred for Physiotherapy treatment from the Department of Orthopaedics. Remaining 13 patients were not included in this study since they had already taken pharmacological agents (N=5) and diagnosed with discogenic neck pain (N=8).

Participant's characteristics

The preliminary investigation note of selected 21 patients from the Orthopaedic Physicians has stated that there were no systemic illnesses and their vitals were measured to be within the normal range. Their history revealed that they had developed sudden onset of ipsilateral neck pain, difficulty to rotate and bend the neck towards the painful side [1]. Also, the cervical spine x-ray (oblique view) showed the evidence for superimposition of articular facets and absence of intervertebral disc pathologies [2]. The physical examinations finds tenderness over facet joint region, positive signs of facet joint provocation tests, referral pain in the ipsilateral shoulder, and marked reduction of cervical spine range of motion [1,2,13].

The assessed mean pain intensity was 73.47 mm in 0-100 mm VAS scale. The measured mean cervical spine range of motion in Sagital plane was 30.38°, frontal plane 13.76°, and transverse plane 15.42° [Table/Fig-1]. According to the NIA guidelines, the minimally invasive facet joint injection/block by the physician can be a confirmatory diagnostic tool to diagnosis the presence of facet joint lock [13]. However, the facet joint injection was not used in this study because it may nullify the definite effects of paraspinal dry needling. So, our diagnosis was based on the physical and radiological examination findings [1,2,13]. Facet joint lock was identified at C3-4 junction in 11 patients, 4 patients each at C2-3, C5-6 junction, and C4-5 junction in 2 patients.

Paraspinal Dry Needling Procedure

Prior to the PSDN, the possible therapeutic and adverse effects of dry needling were explained and a written informed consent was obtained from all the patients. Then, patients were positioned in

prone lying; the area of skin over the cervical spine was cleaned and sterilized with isopropyl alcohol (Alco-Swab®:70% alcohol content). Information regarding the possible mild pinpricking sensation was given to the patients while inserting the dry needle [8]. Tender spot of target locked facet was identified and the needling spot was marked 1.5 cm lateral to the supraspinal line (tip of the spinous process) [10,14]. Similarly, needling spots for one adjacent superior and inferior vertebral segment were marked just 1 cm lateral to the respective cervical vertebra's spinous process [10,11]. Then the sterilized dry needles (30 mm thick × 25 mm length, Cloud & Dragon®, Jiangsu, China) were inserted into the deep cervical back muscles from the marked sites till it reaches the cervical multifidi with slight infero-medial direction [Table/Fig-2].

Target facet joint level PSDN was done to relax deep cervical muscles and relieve the mechanical overloading over the facet joint. And, PSDN over the adjacent vertebral segments were performed to re-activate the spinal rotator and other deep muscles [10,11]. Paraspinal dry needling was done for 12-15 minutes to induce the sustained relaxation of the spinal rotators, multifidi and other deep muscles of cervical spine. Immediately after PSDN the area of skin was compressed manually to normalise the chemical milieu [8]. The outcome measurements were taken immediately after PSDN, 24 hours and 1 week in single session of PSDN treatment. The mean and standard deviation was used to present data and compare the post treatment outcomes scores with baseline values to make inferences.

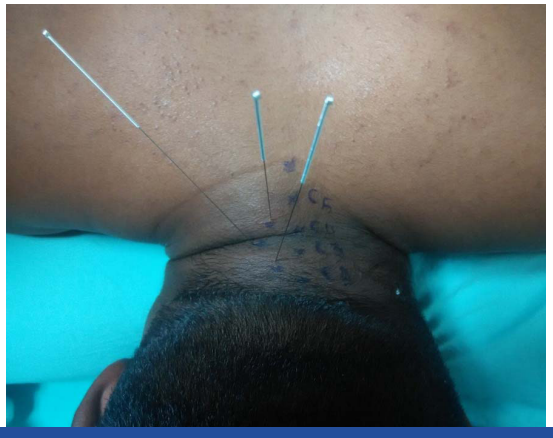
RESULTS

Baseline

The mean age of patients (13 male and 8 female) treated in this study was 24 years (SD=3.95). The baseline mean scores of neck pain is 73.47 (SD=6.23) and the cervical spine range of motion is 30.38° (SD=6.62°) in the sagital plane, 13.76° (SD=2.62°) in frontal plane and 15.42° (SD=2.95°) in transverse plane. These results indicate that the patients were experiencing moderate to severe neck pain and acute reduction of cervical spine movements [Table/Fig-1].

Variables	Mean (SD) / N
Age (Years)	24.04 (3.95)
Gender (Male / Female)	13 / 8
Side affected (Right / Left)	11 / 9
Previous incidence (Yes / No)	5 / 16
Neck Pain (0 - 100 mm VAS)	73.47 (6.23)
Cervical spine ROM in Degrees°	
Sagital plane (Flexion-Extension)	30.38 (6.62)
Frontal plane (Right-Left side flexion)	13.76 (2.60)
Transverse plane (Light-Left side rotation)	15.42 (2.95)

[Table/Fig-1]: Baseline characteristics.



[Table/Fig-2]: Image showing the needling procedure of patient who had C3-4 facet joint lock.

Outcomes variables (n=21)	Immediate post PSDN scores	Follow-up scores	
		24 hours	1 week
	Mean (SD)	Mean (SD)	Mean (SD)
Neck Pain Intensity			
Visual analog score (0 – 100 mm)	18.80 (5.07)	5.85 (2.90)	2.12 (0.45)
Cervical Spine ROM in Degrees°			
Sagital plane (Flexion-Extension)	95.33 (13.07)	115.04 (5.36)	122 (3.75)
Frontal plane (Right-Left side flexion)	91.90 (10.18)	117.42 (4.09)	125 (4.24)
Transverse plane (Right-Left side rotation)	88.28 (9.90)	107.66 (10.04)	115 (6.77)

[Table/Fig-3]: Description of immediate and follow-up pain and cervical spine range of motion.
PSDN- paraspinal dry needling, SD- standard deviation, ROM- range of motion

Adverse events	Number of patients answered 'Yes'	Number of patients answered 'No'
External bleeding	Nil	21
Muscle soreness	04 (very mild)	17
Discomfort during needling	03 (very mild)	18
Blurred vision or syncope	Nil	21
Sleep disturbance after needling	01	20

[Table/Fig-4]: Post needling adverse effects.

Immediate effects

Immediately after PSDN, the mean pain score was reduced to 18. 8mm (SD=5.07) from 73.5 (SD=6.23), which is more than 50mm points lower than the baseline neck pain. Similarly, the post PSDN cervical spine range of motion in sagital (95.33°±13.07°), frontal (91.90°±10.18°) and transverse planes (88.28°±9.90°) were also shown marked improvement from the baseline cervical spine's range of motion [Table/Fig-3].

Follow-up effects

The difference between the baseline and 24 hours follow-up pain (VAS: 68mm), cervical spine range of motion in the sagital (84.66°), frontal (103.66°) and transverse (92.23°) planes have demonstrated that the patients had more than 80% recovery from pain and movement restrictions. Importantly, the one week follow-up scores of pain (VAS: 2.12mm) and cervical spine range of motion (sagital plane: 122°, frontal plane: 125°, transverse plane: 115°) indicate complete recovery from pain and movement deficit [Table/Fig-3].

Harmful effects

The post PSDN skin examinations have shown no indications for external bleeding. There are four patients had experienced very mild muscle soreness and three patients had complaint of minimal discomfort during the needle insertion. Importantly, no patients have experienced moderate or serious adverse effects during and after the paraspinal dry needling. In fact, all 21 patients most satisfied with the treatment outcomes immediately after the PSDN and at the end of 1 week follow-up period [Table/Fig-4].

DISCUSSION

In this study, our hypothesis was that the presence of sustained mechanical stimulus by PSDN may activate the mechano-receptive pain inhibitory pathways to reduce pain and the perception induced descending gamma neurons regulation to relax the guarded muscles [11,12]. This hypothesis may fit into the management of pain and muscle spasm caused by AFJL-WN in order to inhibit alpha motor neuron and pain receptors sensitivity [6,7]. Therefore, our aim was to confirm whether a single session (12-15 minutes) of PSDN is sufficient enough to relieve pain, muscle spasm and facet joint lock.

Thus, these 21 patients who were diagnosed of AFJL-WN selected for PSDN to evaluate its benefits.

The existing literature had documented that the patients of acute wry neck may be experiencing severe neck pain and difficulty in performing neck movements [1,2]. The baseline pain intensity and cervical spine range of motion among the 21 patients' supports the previous literature with regards to the severity of pain and movement restriction in AFJL-WN [Table/Fig-2]. The occurrence of acute facet joint lock at the junction between the third and fourth cervical vertebra was identified in 11 patients which is comparatively larger frequency than the other levels. This could be due to the dominance of position specific biomechanical factors may be created overloading in the deep muscles at C3-4 junction's facet joint [2].

There was a larger numerical difference between the pain scores of baseline [Table/Fig-1] and immediate post needling measurements [Table/Fig-3] provides evidence for the possible therapeutic benefits. Similarly, the cervical spine range of motion in all three planes was also dramatically increased immediately after the PSDN [Table/Fig-3]. These positive outcome variations indicate that the PSDN in the target and associated vertebral segments is capable of reducing pain and movement deficits among the patients with AFJL-WN. This immediate outcome after the 12-15 minutes of PSDN is strongly support the mechano-perception induced sensory motor modulation [12] and adds further therapeutic values for Dr. Gunn's spinal needling approach [11].

Further, this study was also determined to evaluate the very short term follow-up effects of PSDN because there are some possibilities for the reversal of neck pain following the immediate benefits. Interestingly, the 24 hours and 1 week follow-up scores of pain and cervical spine range of motion have not shown any indication for reversal of symptoms. The result reveals faster pain relief and movement recovery for all patients in single session of PSDN. This sustained improvement without deterioration is clearly suggests that the PSDN can be an equally effective intervention tool not only to treat chronic pain but also can produce wonders in acute muscle overloading condition [6-9]. Definitely, this result has opened doors for the dry needling application to treat the AFJL-WN and other likely musculoskeletal conditions.

The neuro-physiological concept of our study hypothesis is well proved by researchers in most of the chronic pain and related movement dysfunctions [7-11]. Additionally the readers can understand the dry needling mechanisms in reducing acute pain and muscle guarding. In the previous literature, Ga H et al., and Gunn CC has found the additional effects of paraspinal dry needling on myofascial pain syndrome [10,11]. A recent pilot report has documented the immediate effects of dry needling on multifidus muscles function [15]. Even though, the stages of the treated conditions were differed from the previously published work to present study, the common dry needling mechanisms were therapeutically benefiting in acute and chronic musculoskeletal dysfunctions [6-11].

CONCLUSION

PSDN in the overloaded muscles of locked facet joint may be very effective in reducing acute pain, muscle guarding and improving the cervical spine range of motion. This evidence may be useful to plan and treat the acute muscle catch during various sports activities by dry needling technique. We recommend physical therapists to use dry needling prior to the muscle stretching and range of motion exercises to maximise therapeutic effectiveness in vice-versa phenomenon. And, further study with control group may give more scientific evidence regarding the paraspinal dry needling in acute wry neck management.

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PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Neuro-Physiotherapy, Nitte Institute of Physiotherapy, Nitte University, Mangalore, Karnataka, India.
2. Professor and Head, Department of Orthopaedics, K S Hegde Medical Academy, Nitte University, Mangalore, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Sukumar Shanmugam,
Assistant Professor, Department of Neuro-Physiotherapy, Nitte Institute of Physiotherapy, Nitte University,
Deralakatte, Mangalore-575018, Karnataka, India.
E-mail: suku729@gmail.com

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