

## Comparison of Integrated Neuromuscular Inhibition Technique versus Myofascial Release of Upper Trapezius on Neck Range of Motion and Dysfunction in Individuals with Nonspecific Neck Pain

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### Abstract

**Background:** Nonspecific Neck Pain is caused by assumption of faulty neck posture for prolonged period of time, resulting in overuse of Upper Trapezius and development of Trigger Points in the muscle. This study evaluated the effect of Integrated Neuromuscular Inhibition Technique and Myofascial Release of Upper Trapezius on Neck Range of Motion and Dysfunction in individuals with Nonspecific Neck Pain.

**Materials and Method:** Based on Inclusion and Exclusion criteria 60 individuals with nonspecific neck pain of age group 25-40 years were assessed & selected by purposive sampling and informed consent were taken. The subjects were divided into three groups of 20 each. Group A (Control Group) was given Conventional treatment as Hot Pack over the Upper Trapezius muscle and Neck mobility exercises. Thereafter Group B (Experimental Group 1) received Integrated Neuromuscular Inhibition Technique & Conventional treatment and Group C (Experimental Group 2) subjects were given Myofascial Release & Conventional treatment on Upper Trapezius muscle for total 6 sessions as 3 sessions a week for 2 weeks respectively. Pretest and Post test data for the 3 groups were evaluated for Neck Range of Motion by using Universal Goniometer and Neck Dysfunction by using Neck Disability Index respectively. The data was collected, compiled and analyzed.

**Results:** There were significant differences in pre and post scores of Group B (INIT) and Group C (MFR) when paired t-test was applied. However, Group A (control group) didn't show any improvement significantly. When these groups are compared using unpaired t-test, all showed significant differences. Group B demonstrated more improvement than Group C and Group A. Whereas, when Group C and Group A were compared, Group C showed significant improvement than Group A.

**Conclusion:** The study concluded that Integrated Neuromuscular Inhibition Technique is better than Myofascial Release on Upper Trapezius muscle in improving Neck Range of Motion and Dysfunction in Individuals with Nonspecific Neck Pain.

**Keywords:** Nonspecific neck pain; upper trapezius; neck dysfunction

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## Introduction

Neck pain is one of the most common musculoskeletal disorders in the general population as mentioned by Fejeret al<sup>1</sup>. Roughly two thirds of the general population have neck pain at some time in their lives and the prevalence is highest in middle age as mentioned by Jyotsna et al<sup>2</sup>. "Nonspecific Neck Pain" is defined as simple neck pain without a specific underlying disease causing the pain, which results from postural and mechanical causes. The non-specific neck pain commonly seen in people involved in occupation like computer processing, students, sedentary life style etc. as mentioned by Alberto De Vitta et al.<sup>3</sup>. Aetiological factors are poorly understood and are usually multifactorial, including poor posture, anxiety, depression, neck strain, and sporting or occupational activities as mentioned by Binder.<sup>4</sup>

The upper trapezius muscle, which spans the neck and shoulder, contributes to normal cervical vertebra and scapula motion as mentioned by Johnson et. al.<sup>5</sup>.

The upper trapezius being a postural muscle is highly susceptible to overuse. Interruptions of low frequency in the muscle activity during repetitive tasks are associated with future development of neck pain. Muscle spasm keeps the muscle continuously in contraction and this overload creates knot in the muscle. These are known as trigger points leading to pain as mentioned by Hermanset al.<sup>6</sup>. Myofascial trigger point is most commonly found in the midpoint of upper border of trapezius as mentioned by Chaudhary et al.<sup>7</sup>. Pain, stiffness and tenderness are felt on palpation in the belly and at paraspinal region as mentioned by Carneroet al.<sup>8</sup>. Tightness in muscle reduces the range of neck movements as well as the mobility of the cervical joints. Neck pain and restricted movements give a subjective feeling of stiffness which further aggravate pain and ultimately leads to muscle spasm, increase in soft tissue tightness, with an ensuring pain-spasm cycle which can be difficult to break as mentioned by Helen et al.<sup>9</sup>

Myofascial trigger point can be defined as a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. The etiology of TrP development is currently unknown, recent studies have hypothesized that the

pathogenesis results from the overloading and injury of muscle tissue, leading to involuntary shortening of localized fibers as mentioned by Simons et al.<sup>10</sup>

The combination of Muscle Energy Technique, Ischemic compression and Strain Counter strain produces the most effective, targeted approach to Trigger point release. This method is termed the Integrated Neuromuscular Inhibition Technique (INIT). He has suggested that the benefit of the technique lies in its multifaceted approach. The INIT approach allows for delivery of the techniques in a single coordinated manner as mentioned by Albert et al.<sup>11</sup> Effectiveness of Integrated Neuromuscular Inhibition Technique has been reported in two case series, which showed rapid results with decreased pain and stiffness. The individual components (Trigger Point Release, Positional Release Technique and Muscle Energy Technique) of INIT has also been proved effective for treating myofascial pain syndrome as discussed by Singh et al.<sup>12</sup>

Myofascial release (MFR) is a progressive pressure release technique which is used to decrease muscle tension by elongation of the muscle fiber thereby increasing gradual pressure on the motor trigger point. Study has proved successful to decrease pressure pain sensitivity as mentioned by Ellythy.<sup>13</sup>

## Materials and Methods

**Study Design:** This study is an Experimental study which is comparative in nature.

**Sampling Technique:** The subjects selected by Purposive Sampling.

**Source of Data:** Subjects will be taken from All Saints Institute of Medical Sciences and Research Out Patient Department and Physiotherapy clinics in and around Ludhiana.

### Eligibility

### Inclusion Criteria

- Both male and female subjects between age group of 25-40 years.
- Subjects with history of neck pain without any specific etiology like trauma from past 6 months.

- Subjects who are not involved in any routine sports training and conditioning programme.

**Exclusion Criteria**

- Subjects with history of recent trauma of Cervical spine.
- Subjects with history of Sprain and Strain of Cervical region.
- Subjects with history of Cervical Radiculopathy.
- Subjects with inflammatory disorders of Cervical spine.
- Non Cooperative subjects.

**Procedure**

Based on Inclusion and Exclusion criteria, 60 Individuals between age group 25-40 years were selected by purposive sampling and informed consent was taken. Subjects were divided into 3 Groups of 20 each as Group A,B, C.

Pretest data was obtained for Neck Range of Motion using Universal Goniometer and Neck Dysfunction was evaluated using a Neck Disability Index respectively.

**Group A** including 20 subjects were given Conventional treatment as Hot Pack over Upper Trapezius for 10 min and Neck Mobility exercises for 10 repetitions respectively.The protocol was 3 sessions per week for 2 weeks.

**Group B** including 20 subjects was given

Conventional treatment as Hot Pack over Upper Trapezius for 10 min and Neck Mobility exercises for 10 repetitions respectively.

Thereafter, the subjects received INIT protocol consisting of three techniques that performed in co-ordinated manner. i.e. Ischemic Compression, Strain-Counterstrain and Muscle Energy Technique for Upper Trapezius muscle.The protocol was 3 sessions per week for 2 weeks.

**Group C** including 20 subjects were given Conventional treatment as Hot Pack over Upper Trapezius for 10 min and Neck Mobility exercises for 10 repetitions respectively.Thereafter, the subjects were given MFR over Upper Trapezius muscle.

The Protocol included 10 repetitions in set, thrice a week for two weeks.Post test for Pretest data obtained for Neck Range of Motion using Universal Goniometer and Neck Dysfunction will be evaluated using a Neck Disability Index respectively.

The data was collected, compiled and analyzed.

**Statistical Analysis**

Data was meaningfully assorted through calculations of Mean and SD. Later on paired ‘t’ test was applied for comparison within the Group A, B and C for NDI Scale and ROM. Thereafter, Unpaired ‘t’ test was applied for comparison between the Group A, B and C for NDI Scale and ROM respectively. The level of significance was fixed at  $p < 0.05$ .

**Results**

**Table 1: Comparison of INIT and MFR (NDI Scale) between Group B and C**

Unpaired T Test	INIT vs MFR			
	NDI SCALE			
	Pre-test		Post-test	
	Group B	Group C	Group B	Group C
Mean	18.80	18.75	17.05	10.05
S.D.	2.913	2.593	2.781	2.544
‘t’ value	0.057		8.306	
Result	NS		S	

The Unpaired ‘t’ test gave ‘t’ value 8.306 which was statistically Significant for NDI Scale at  $p > 0.05$ .

**Table 2: Comparison of INIT and MFR (Left Neck Lateral Flexion ROM) between Group B and C**

Unpaired T Test	INIT vs MFR			
	NECK LATERAL FLEXION ROM (LEFT)			
	Pre-test		Post-test	
	Group B	Group C	Group B	Group C
Mean	30.50	31.25	37.80	36.65
S.D.	1.539	2.268	1.281	1.981
't' value	1.224		2.180	
Result	NS		S	

The Unpaired 't' test gave 't' value 2.180 which was statistically significant for Neck Lateral Flexion ROM (Left) at  $p > 0.05$ .

**Table 3: Comparison of INIT and MFR (Right Neck Rotation ROM) between Group B and C**

Unpaired T Test	INIT vs MFR			
	NECK ROTATION (RIGHT)			
	Pre-test		Post-test	
	Group B	Group C	Group B	Group C
Mean	56.20	56.20	63.50	61.25
S.D.	1.196	1.196	1.638	1.209
't' value	0.000		4.943	
Result	NS		S	

The Unpaired 't' test gave 't' value 4.943 which was statistically significant for Neck Rotation ROM (right) at  $p > 0.05$ .

### Discussion

The data was analyzed through paired 't' test for comparison within Groups which gave 't' value for NDI Scale for Group A 1.675, for B 20.424, for C 20.879. Paired 't' values for Neck Lateral flexion (left and right) within Group A were 1.789 and 1.453 which was statistically non-significant, whereas within Group B paired values were 40.742 and 17.411, whereas within Group C paired values were 25.683 and 33.645 and for Neck Rotation (left and right) within Group A were 1.832 and 1.453 which was statistically non-significant, within Group B was 24.330 and 16.302, within Group C were 32.776 and 15.022 which was statistically significant.

Thereafter, Unpaired 't' test for applied for NDI Scale for comparison between Group A and B which gave 't' value as 8.306, Group A and C 5.908, Group B and C 2.565, which was statistically significant with  $p < 0.05$ . Thereafter, Unpaired 't' test was applied for Neck Lateral Flexion (left and right)

for comparison between Group A and B which gave 't' value as 15.595 and 9.349, Group A and C 9.878 and 8.076, Group B and C 2.180 and 2.131, which was statistically significant. Similarly, the Neck Rotation (left and right) for comparison between Group A and B gave 't' value as 16.834 and 13.942, Group A and C 12.145 and 10.931, Group B and C 6.114 and 4.943, which was statistically significant.

The result of Group B which received INIT came out to be significant in correlation to study which compared the effect of INIT versus TENS with passive stretching in patients with Upper Trapezius in NSNP and the result concluded that the effect of INIT is more effective than TENS with passive stretching on upper trapezius trigger points in reducing pain and improvement of function in patients with NSNP as mentioned by Aartee.<sup>18</sup>

The result of the Group C which received MFR came out to be significant in correlation to the study which compared the effects of Myofascial Release

Technique and cold pack in Upper Trapezius spasm. There was significant difference in post treatment comparison between MFR and Cold pack group. The MFR group showed more significant improvement than cold pack in VAS, PPT and ROM score. When Myofascial Release is used on the TrPs, local chemistry changes due to blanching of the nodules followed by hyperaemia. This flushes out the muscle inflammatory exudates and pain metabolites, breaks down the scar tissue, desensitizes the nerve endings and reduces muscle tone as mentioned by Irnich D et al.<sup>20</sup>

Another study which aimed to investigate the efficacy of MFR plus therapeutic exercise for management of NSNP concluded that MFR improves pain and movement in patients with neck pain. Fascia restriction of the neck area may result in excessive tension in other parts of the body because the fascia is continuous. Application of MFR in the neck area can reduce this excessive tension and improve cervical movement and impaired sliding fascial mobility in people with non specific neck pain as mentioned by Ajimsha et al.<sup>21</sup>

The comparison between Group A, B, C showed significant improvement in Neck ROM and Dysfunction in individuals with NSNP of Group B and C while Group A did not show any improvement. The improvement was more in Group B who received INIT for Upper Trapezius than Group C which received MFR. On the basis of the results, it can be concluded that the present study provided evidence to state that INIT showed more efficacy in treating ROM and Dysfunction in individuals with NSNP than the Control Group.

### Conclusion

The study concluded that there was a significant variation of values between the effect of Integrated Neuromuscular Inhibition Technique versus Myofascial Release on Upper Trapezius muscle on Neck Range of Motion and Dysfunction in individuals with Nonspecific Neck Pain. Therefore Alternate Hypothesis was accepted and Null Hypothesis was rejected. Comparison of Post-test mean values revealed that Integrated Neuromuscular Inhibition Technique was better than Myofascial Release on

Upper Trapezius muscle on Neck Range of Motion and Dysfunction in individuals with Nonspecific Neck Pain.

### Limitations

- Study had a small sample size.
- Type of Nonspecific Neck Pain was not taken into consideration.
- Study focused only on upper trapezius, other muscles were not considered.
- Daily routine activities were not taken into consideration.

**Source of funding:** No funding was obtained for the study.

**Conflict of Interest:** No conflicts of interest are present.

**Ethical clearance:** The research was conducted in accordance to the ethical standards of Baba Farid University of Health Sciences along with the following reference number ASP-MPO-2020/02. Written informed consent were provided by all participants prior to participation.

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