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EFFECTIVENESS OF INTEGRATED NEUROMUSCULAR INHIBITORY TECHNIQUE (INIT) ON PAIN, RANGE OF MOTION AND FUNCTIONAL ABILITIES IN SUBJECTS WITH MECHANICAL NECK PAIN

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Abstract: AIM: To evaluate the effect of integrated neuromuscular inhibitory technique on pain, range of motion and functional abilities in subjects with mechanical neck pain. **OBJECTIVES:** To evaluate the effect of INIT on pain through visual analogue scale in subjects with mechanical neck pain.To evaluate the effect of INIT on range of motion through universal goniometer in subjects with mechanical neck pain.To evaluate the effect of INIT on functional abilities through neck disability index in subjects with mechanical neck pain. **METHODOLOGY:30** samples were taken with simple random sampling and are assigned to one of the two groups by randomized controlled trial. Control group received conventional physiotherapy where as Experimental group received INIT approach along with conventional physiotherapy for 2 weeks. Subjects were assessed at baseline, and 2nd week for pain by visual analogue scale, range of motion of cervical spine by goniometer and functional abilities by neck disability index. **RESULTS:**Data analysis were computed by paired sample t-test and Wilcoxon signed rank test has been applied for pre and post values at each group and also independent sample t- test and Mann Whitney U- test to compare the two groups. Descriptive measures such as mean and standard error values were also reported. Results showed that there exists a statistical significance between the groups. **CONCLUSION:**This study supports that trigger points in trapezius and levator scapulae can cause neck pain, with restriction in cervical ROM and increased disability according to neck disability index. Individually both experimental and control group were found to be effective in reducing pain, improving cervical ROM and reducing neck disability, however when both groups were compared, there was a significance of Experimental group with greater mean than Control group. Hence it can be concluded that INIT is more effective in managing mechanical neck pain due to trigger points.

Keywords: Integrated Neuromuscular Inhibitory technique, Trigger points, Mechanical neck pain, Neck disability Index.

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INTRODUCTION

Neck pain is a major contributor to disability worldwide, with about 70% of the population experiencing an episode of neck pain at some point in their lives. Mechanical neck pain affects 45-54% of the general population and can result in severe disability[1].Prevalence of neck pain increases with age and is most common in women around fifth decade of life[2].

The exact etiology of the mechanical neck pain is not clearly understood but it may be associated with muscular, joint and neural impairments. Simons et al (1999) have claimed that myofascial trigger points (MTrPs) from neck and shoulder muscles might play a major role in genesis of mechanical neck pain[3].

A Trigger point(TrP) is defined as a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. There are several precipitating and perpetuating factors such as mechanical, nutritional, metabolic, and psychological factors resulting in the formation of Trigger points. Presence of tender spot within the taut band in skeletal muscles, Palpable or visible local twitch response, Jump sign, typical reffered pain pattern are the important signs of TrPs[3,4].

TrPs have a potential to create pain, limit ROM and restricted functional activities. Currently a large variety of both manual and non-manual interventions exist for the deactivation of TrPs. Few studies are available in the literature supporting the effective method of treatment for active MTrps. So far, less systematic and RCT'S were done to study the effect of INIT. Hence, need is to find out the effectiveness of INIT with conventional physical therapy techniques on pain, ROM and functional status in subjects with mechanical neck pain with trigger points.

INIT approach allows the delivery of the technique in a single co-ordinated manner. INIT involves using the position of ease as a part of a sequence which commences with the location of a tender point, followed by the application of Ischemic compression (IC) and then Strain Counter Strain (SCS). After an appropriate length of time during which the tissues are held in ease (20-30sec) then the patient is guided to introduce an isometric contraction into the tissues housing the trigger point and held it for 7-10sec, after which these tissues are stretched[5].

METHODOLOGY:

30 subjects who were diagnosed with mechanical neck pain along with active trigger points were selected from the outpatient departments of SVIMS and BIRRD hospitals, Tirupati. A single blinded randomized controlled trial was conducted between Aug 2012 and March 2013.

Inclusion criteria:

- Female subjects of age between 25 to 40 years with active trigger points in upper trapezius and levator scapulae on both sides.

Exclusion criteria:

- Neck pain with Significant trauma
- Signs of serious pathology malignancy or infection
- Cervical spinal cord compromise
- Nerve root involvement
- History of neck surgery in the past 12 months
- History of cervical degenerative joint disease
- Trigger point injections with in past 6 months

30 subjects were randomized by simple random sampling method into two groups. The subjects were included in the study after obtaining the written informed consents. Before randomization subjects were evaluated for pain, ROM and functional activities by using VAS, goniometer and NDI questionnaire respectively.

Control group received conventional physiotherapy which includes cryotherapy, trapezius and levator scapulae muscle stretching's and neck isometric and strengthening exercises. Experimental group received INIT technique along with conventional therapy for 5days in a week for two weeks.

STATISTICAL ANALYSIS AND RESULTS:

Statistical analysis has been carried out to analyze the significant impact of the treatments issued to the subjects of both control and experimental groups by using IBM SPSS Inc.20.0 version. Statistical tools such as independent sample t-test and paired sample t-test has been applied to the parameters namely lateral flexion right and left and rotations right and left, and for NDI. Whereas for VAS, non-parametric test such as Mann-Whitney U test and Wilcoxon signed rank test has been applied. Descriptive measures like mean and standard error mean have been reported along with p-value.

TABLE -1: COMPARISON OF MEAN DIFFERENCE OF PRE &POST VALUES OF VAS OF EXPERIMENTAL AND CONTROL GROUPS:

PARAMETER	GROUP	N	Mean ± Std. Deviation	Z-value (Sig.)
VAS	Experimental	15	4.80 ± 1.320	-4.776 (0.000*)
	Control	15	1.60 ± 0.632	

To test the comparison between post values of experimental with control group, Mann Whitey U test has been used.

Results: The post mean difference values of VAS of experimental and control group are 4.80 and 1.60 respectively.

Inference : It is observed that there is a statistical significance ($p<0.05$) is existing between control and experiment with respect to VAS. And also it is noticed that experimental group is found to be better with greater mean. The similar type of interpretation can be observed in the following graphs

FIG -1: GRAPHICAL REPRESENTATION OF POST MEAN DIFFERENCES OF VAS OF BOTH GROUPS

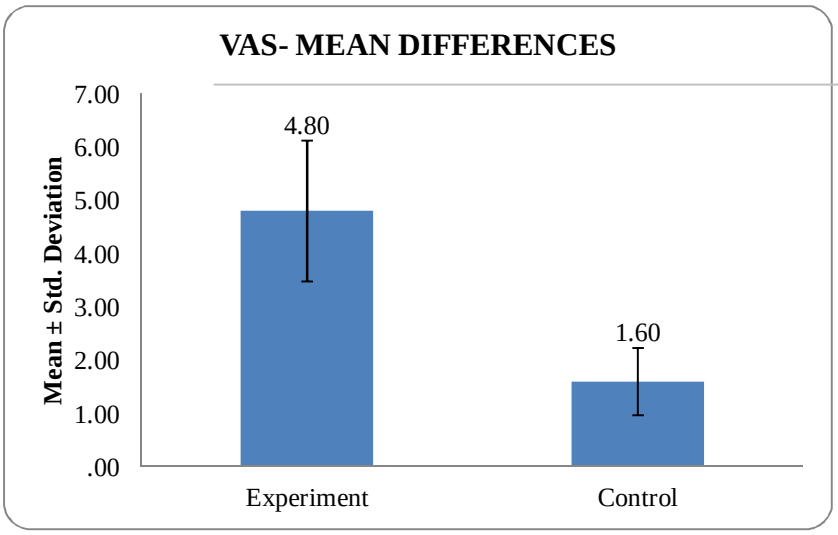


TABLE-2 ANALYSIS OF PRE AND POST VALUES OF NDI OF EXPERIMENTAL AND CONTROL GROUPS:

GROUP	PARAMETER		N	Mean ± Std. Error	t-value (Sig.)
EXPERIMENTAL	NDI	PRE	15	38.13 ± 3.162	8.788
		POST	15	15.07 ± 1.136	(0.000*)
CONTROL	NDI	PRE	15	22.53 ± 1.618	8.195
		POST	15	17.00 ± 1.047	(0.000*)

To test the pre and post values of NDI in experimental and control groups paired sample t- test has been used.

Results: Pre and post mean values of NDI in experimental group were 38.13 and 15.07 which shows significant reduction in postoperative values. Pre and post mean values of control were 22.53 and 17.00 which shows a significant reduction in postoperatively.

Inference : It was observed that there was a statistical significance ($p<0.05$) existing between all the pairs of observations of pre and post time periods for Experimental and control group with respect to NDI. The similar type of interpretation can be observed in the following graphs

TABLE – 3: COMPARISON OF MEAN DIFFERENCE OF PRE&POST NDI OF EXPERIMENTAL AND CONTROL GROUPS:

PARAMETER	GROUP	Mean ± Std. Error	t-value (Sig.)
NDI	EXPERIMENTAL	23.07 ± 2.625	6.469
	CONTROL	5.53 ± 0.675	(0.000*)

To compare the post values of NDI in experimental and control group independent t test has been used.

RESULTS: The post mean difference values of NDI of experimental and control group are 23.07 and 5.53 respectively.

INFERENCE: On performing the Independent Samples t-test, it was observed that there was a statistical significance ($p<0.05$) existing between control and experiment with respect to NDI.

And also noticed that experimental group was found to be better with greater mean. The similar type of interpretation can be observed in the following graphs

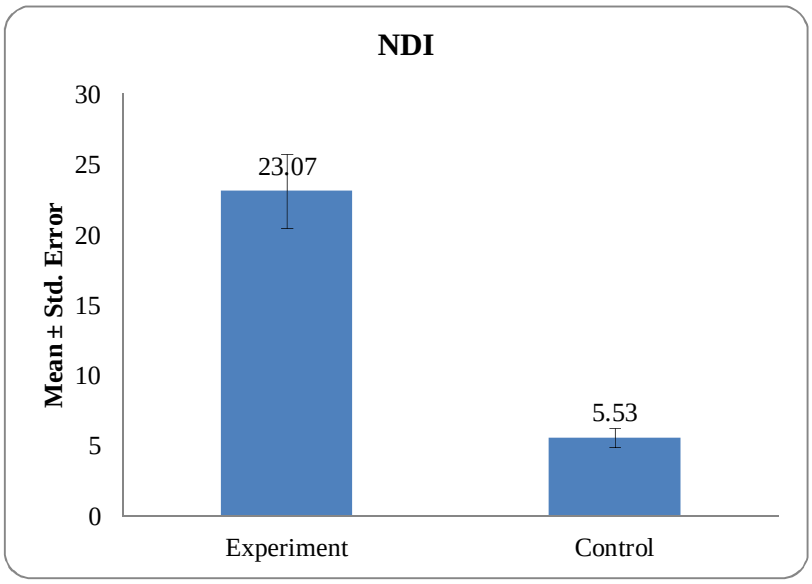


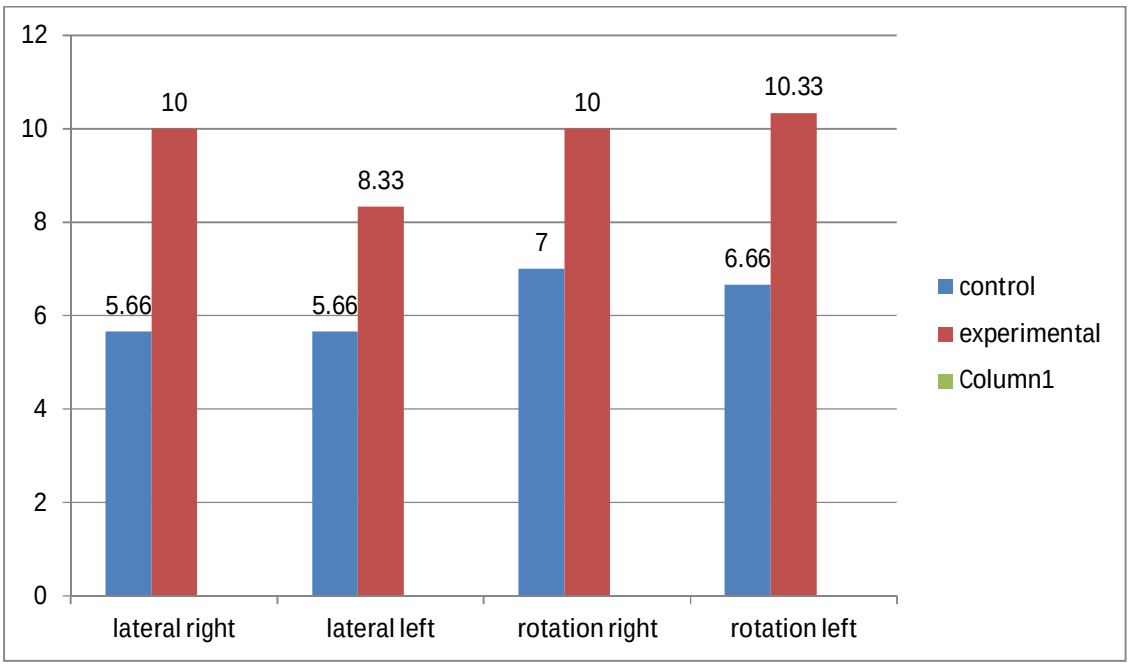
FIG – 2: GRAPHICAL REPRESENTATION OF POST MEAN DIFFERENCE VALUES OF NDI OF EXPERIMENTAL AND CONTROL GROUP

TABLE –4: COMPARISON OF MEAN DIFFERENCE OF PRE& POST ROM OF EXPERIMENTAL AND CONTROL GROUP:

Parameter	Group	N	Mean ± Std. Error	t-value (Sig.)
Lateral flexion right	Experimental	15	10.00 ± 1.291	2.694
	Control	15	6.33 ± 1.141	(0.042*)
Lateral flexion left	Experimental	15	8.33 ± 0.934	2.323
	Control	15	5.66 ± 0.666	(0.028^{S})
Rotation right	Experimental	15	10.33 ± 1.031	2.729
	Control	15	7.00 ± 0.655	(0.012*)
Rotation left	Experimental	15	10.00 ± 1.241	2.486
	Control	15	6.67 ± 0.797	(0.019^{S})

On performing the Independent Samples t-test, it was observed that a statistical significance ($p<0.05$) existing between control and experiment with respect to ROM. Also it is noticed that the experimental group has found to be better with greater mean difference than the control group.

FIG – 3: REPRESENTATION OF POST MEAN DIFFERENCE OF ROM OF BOTH GROUPS



DISCUSSION:

A total number of 30 female subjects with mechanical neck pain with mean age of (28.19) were constituted the sample of the study. The result of this study showed a significant reduction in pain, increase in ROM, and improvement in functional activities after 2 weeks of protocol compared with pre and post treatment in both groups but there was a greater mean difference of significance in experimental group when compared to control group.

Subjects receiving INIT reduced their pain levels by a mean change of VAS of 4.8mm to subjects in control group of 1.6mm.and also INIT reduced neck disability by a mean difference of 23.07 points compared to control group.

The benefit of the experimental group over the control group may lie in the addition of INIT that is combination of ischemic compression, SCS and METS. Subjects in experimental group who received INIT reduced their pain levels. The pain reduction may be due to stimulation of mechanoreceptors, which has influence on pain gate during application of trigger point

pressure release and increased circulation, after releasing the pressure with ultimately resulted in pain reduction.

A study conducted by Amit V Nagrale et al. (2010) on the efficacy of INIT on upper trapezius trigger points in subjects with non-specific neck pain on 60 subjects in which 30 subjects were randomized to receive METs and 30 subjects received INIT. The results indicate that METs may be a viable option for addressing active TrPs in the upper trapezius muscle, however, the addition of ischemic compression & SCS to the METs, INIT produced significantly greater results. Subjects who received INIT reduced their pain levels by a VAS of 1.18 mm compared to the individuals that received the METs in isolation[5].

Sibby et al. (2009) compared the effectiveness of INIT and Laser with stretching in reducing pain, improving ROM and functional activities of subjects with neck pain due to upper trapezius trigger points and concluded that both INIT and Laser with stretching are equally effective in managing subjects with neck pain due to upper trapezius trigger point[8].

According to Travell, ischemic compression decreases the sensitivity of pain nodules in muscles. Simons proposed that local pressure may equalize the length of sarcomeres in the involved TrPs and consequently decreases the pain. Additionally, SCS has been proposed as a mechanism of facilitating unopposed arterial filling which allows for a reduction of tone in the muscles involved. This reduction of tone improves local circulation. These changes ultimately facilitates neural resetting, resulting in a more normal resting length, enhanced circulation, and decreased pain[3].

Fernandez et al. (2006) concluded that trigger point pressure release and transverse friction massage reduced pain due to upper trapezius trigger points in patients with neck pain[6].Hantel et al (2000) also reported that reduction in pain after Trigger point release (TPR) to the muscles. In this study integrated approach of TPR and Positional Release Technique (PRT) was more effective than single technique.

Gemmell et al (2008) determined the immediate effect of ischemic compression, trigger point pressure release and placebo ultrasound on upper trapezius trigger points in subjects with non-specific neck pain and concluded that ischemic compression is superior to sham ultrasound in immediately reducing pain which supports the results of this study[9].

Cervical ROM (lateral flexion and rotations) was significantly improved in both groups but greater significance was observed in experimental group. This improvement in ROM was mainly due to PRT and METS which mainly works on reducing spasm or tightness of muscle by first resetting the muscle spindle and inhibiting the muscles by activating the golgi tendon organ. This phenomenon is called post isometric relaxation in which there is a period of a relative

hypotonicity during which a stretch of the involved muscle is more easily achieved than before contraction. A study by Lewit and Simons (1984) observed that PIR helps in reducing the increased tension by restoring the full length of the muscle [7].

The INIT also reduced the participant's neck disability. Blanco and colleagues identified the benefit of the PIR approach (METS) on latent masseter muscle TrPs as demonstrated by an improvement in active mouth opening ($p<0.01$)[10].

CONCLUSIONS:

This study supports that trigger points in trapezius and levator scapulae can cause neck pain, with restriction in cervical ROM and increased disability according to neck disability index. Individually both the experimental and control group were found to be effective in reducing pain, improving cervical ROM and reducing neck disability, however when both groups were compared, there was a significance of experimental group with greater mean than control group. Hence it can be concluded that INIT is more effective in managing mechanical neck pain due to trigger points.

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