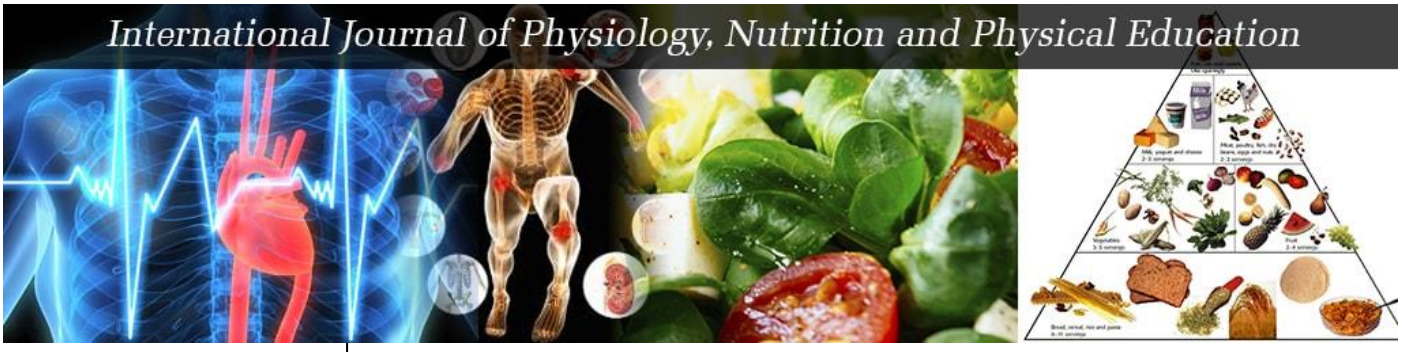

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Combined effect of myofascial trigger point therapy and rehabilitative exercise on upper cross syndrome among men software professionals

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Abstract
The aim of this study was to examine combined effect of myofascial trigger point therapy and rehabilitative exercise on upper cross syndrome among men software professionals. A total of thirty men patient with upper cross syndrome were randomly selected as subjects and their age ranged between 35 to 45 years. They were divided into two groups. Group I treated as myofascial trigger point therapy and rehabilitative exercise (n=10), and Group II acted as control group (n=10). The experimental group participated in the myofascial trigger point therapy and rehabilitative exercise treatment for a period of ten weeks. The pain intensity, range of motion and neck flexor index were assessed before and after treatment through visual analog scale, Goniometer and performance index measure test respectively. Data were analyzed on SPSS 25. The results showed that patients in the treatment group decreased pain intensity and improved range of motion and neck flexor index. In conclusion the treatment program consisting of myofascial trigger point therapy and rehabilitative exercise may be more effective in reducing pain intensity and improving the range of motion (ROM) and neck flexor index in upper cross syndrome men software professionals.

Keywords: Myofascial trigger point therapy and rehabilitative exercise, pain intensity, range of motion and neck flexor index

Introduction
The development of science and technology, people who are engaged in computer work largely increased. Computer work requires long time sitting in front of the screen, typing the keyboard drag the mouse and manage with files etc., therefore, it easily cause pressure on upper limb muscle and joints. Hence, the tendency of getting the symptoms of neck and shoulder pain, stiffness, wrist pain rises enormously.

Neck pain is one of the major health problems encountered by public which affects their personal health, overall well-being and serves as an indirect expense to them **(**Fejer, Kyvik and Hartvigsen, 2006) [2] Neck pain is a common musculoskeletal disorder (MSD) that affects approximately one-third of adults. Co-morbidities of neck pain such as low back pain, shoulder pain, arm pain and wrist pain among computer based professionals are more prevalent (Mohandoss, *et al*., 2014) [8]. Upper cross syndrome is becoming more prevalent in today's population. It develops because of imbalances among muscles and its motor control. The term upper Crossed syndrome was coined by Vladimir Janda (1988) [4].

The upper cross syndrome is defined as tightness of the upper trapezius, pectoralis major, and levator scapulae and weakness of the rhomboids, serratus anterior, middle and lower trapezius, and the deep neck flexors (Rectus Capitus Anterior, Rectus Capitus Lateralis, Longus Capitus, Longus Colli) and the scalene muscles. Janda named this syndrome ‘‘Upper Crossed’’ because when the weakened and shortened muscles are connected in the upper body, they form a cross (Umashankar Mohanty, 2015) [11]. Upper-cross syndrome (UCS) is also referred to as proximal or shoulder girdle crossed syndrome (Vladimir Janda, 1988) [4]. The syndrome mainly arises as a result of muscular imbalance that usually develops between tonic and phasic muscles, tonic muscles are the muscles that most of the time become tight i.e. over facilitated whereas phasic muscles are the muscles of lower activation i.e. they are more towards developing inhibition (Vladimir Janda, 1988 & Kendall, McCreary, *et al*. 2005) [4, 6].

Upper Cross Syndrome is characterized by postural dysfunction of protracted scapula, medially rotated Humeri, hyperkypotic (flexed) upper thoracic spine and a protracted head with extended cervical spine. This atypical posture produces overstress of the cervico-cranial junction, the C4-5 and T4 segments, and the shoulder due to altered motion of the gleno-humeral joint. Excessive stress on the T4 segment can occasionally cause chest pain of pseudoangina pectoris (Lewit, 1991) [7].

Myofascial trigger points (MTrPs), also known as trigger points, are described as hyperirritable spots in the skeletal muscle. They are associated with palpable nodules in taut bands of muscle fibers. Micro lesions in the muscle fiber (muscle cell) organ called sarcoplasmic reticulum. They are triggered for example by muscular overload, such as by an injury or overuse. The sarcoplasmic reticulum is a membrane system within the muscle fiber. One of the functions of the sarcoplasmic reticulum is to transport and store calcium ions. Any lesion in the sarcoplasmic reticulum system may lead to excessive release of calciumions and thus sustained contractions of muscle fibers. This is because calcium triggers muscle fiber contraction (Hrysomallis, 2010) [3].

Multiple contractions of this kind in a specific region in the muscle may form a taut band that is easily palpable by trained practitioners. These sustained muscle contractions can then lead to poor circulation in that area due to blood vessels being compressed, preventing adequate oxygen supply to the muscle and not allowing it to heal properly. If this condition becomes chronic, the muscle may further contract and become painful. This is referred to as the "Energy Crisis Theory" (Hrysomallis, 2010) [3].

Rehabilitation is defined as “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment”. Rehabilitation can reduce the impact of a broad range of health conditions, including diseases (acute or chronic), illnesses or injuries. It can also complement other health interventions, such as medical and surgical interventions, helping to achieve the best outcome possible. For example, rehabilitation can help to reduce, manage or prevent complications associated with many health conditions, such as spinal cord injury, stroke, or a fracture (Gillani, 2011). Rehabilitation is an important part of universal health coverage and is a key strategy for achieving Sustainable Development Goal “Ensure healthy lives and promote well-being for all at all ages”. In this context, the objectives of this study was to examine the effect of myofascial trigger point therapy and rehabilitative exercise on Upper Cross Syndrome among men software professionals.

Methods

A total of thirty men patient with upper cross syndrome were randomly selected as subjects and their age ranged between 35 to 45 years. They were divided into two groups. Group I treated as myofascial trigger point therapy and rehabilitative exercise (n=10), and Group II acted as control group (n=10). The experimental group participated in the myofascial trigger point therapy and rehabilitative exercise treatment for a period of ten weeks. The pain intensity, range of motion and neck flexor index were assessed before and after treatment through visual analog scale, Goniometer and performance index measure test respectively. They were informed about the objectives of the study, possible discomforts of the procedures, voluntary nature, right of secrecy, and possibility of withdrawal at any stage of the research, and after the acceptance of the study, they signed a free and informed consent form. Out of 45 contacts received, 30 are randomly selected who had evidence like neck pain with disabilities. All the data were analyzed in the computer using ‘SPSS’ 25 statistical package. The level of was fixed at 0.005 level of significance as the numbers of subject were limited and also the selected variable might fluctuate due to various extraneous factors as mentioned in the limitation.

Results of the study

Thirty subjects were recruited for the study. The results presented in table I shows paired ‘t’ test was used to analyze the difference between pre and post values of pain intensity. The experimental group demonstrated significant differences between pre (7.60) and post (1.20) values of pain intensity. In the control group, no significant differences were found between pre (7.00) and post (6.50) values of pain intensity. The obtained paired ‘t’ value of 24.00 was greater than the required ‘t’ table value of 3.250 at 0.005 level, it shows that there was significant reduction in pain intensity. The subjects in experimental group showed significant reduction of pain intensity when compared to the control group.

Table 1: Pre and posttest differences were compared by paired‘t’ test on Pain Intensity

Groups	Pre-test Mean	Post-test Mean	Mean Difference	Std. Dev +/-	Variance	t’ ratio
Experimental Group	7.60	1.20	6.40	0.84	0.71	24.00*
Control Group	7.00	6.50	0.50	0.85	0.72	1.86

The results presented in table II shows paired ‘t’ test was used to analyze the difference between pre and post values of range of motion. The experimental group confirmed significant differences between pre (12.40) and post (29.60) values of range of motion. In the control group, no significant differences were found between pre (12.90) and post (14.80) values of range of motion. The obtained paired ‘t’ value of 25.30 was greater than the required ‘t’ table value of 3.250 at 0.005 level, it shows that there was significant improvement in range of motion. The subjects in experimental group showed significant increases of range of motion when compared to the control group.

Table 2: Pre and posttest differences were compared by paired‘t’ test on Range of Motion

Groups	Pre-test Mean	Post-test Mean	Mean Difference	Std. Dev +/-	Variance	t' ratio
Experimental Group	12.40	29.60	17.20	2.15	4.62	25.30*
Control Group	12.90	14.80	1.90	1.10	1.21	5.46

The results presented in table III shows paired ‘t’ test was used to analyze the difference between pre and post values of neck flexor index. The experimental group revealed significant differences between pre (3.20) and post (6.30) values of neck flexor index. In the control group, no significant differences were found between pre (3.70) and

post (4.80) values of neck flexor index. The obtained paired 't' value of 9.86 was greater than the required 't' table value of 3.250 at 0.005 level, it shows that there was significant improvement in neck flexor index. The subjects in experimental group showed significant increases of neck flexor index when compared to the control group

Table 3: Pre and posttest differences were compared by paired't' test on Neck Flexor Index

Groups	Pre-test Mean	Post-test Mean	Mean Difference	Std. Dev +/-	Variance	t' ratio
Experimental Group	3.20	6.30	-3.10	0.99	0.99	9.86*
Control Group	3.70	4.80	-1.10	0.99	0.99	-3.50

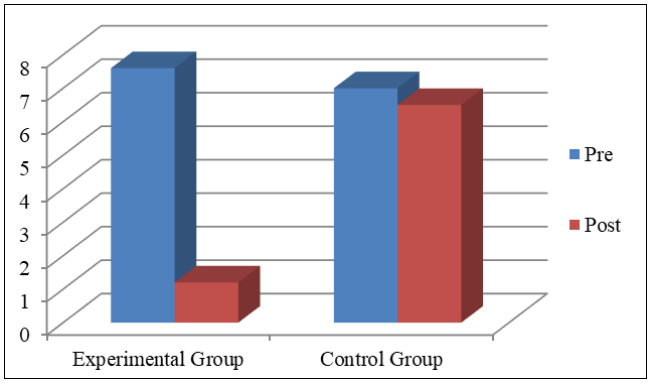

Fig 1: Bar diagram showing the Pre and Post-test means on Pain Intensity

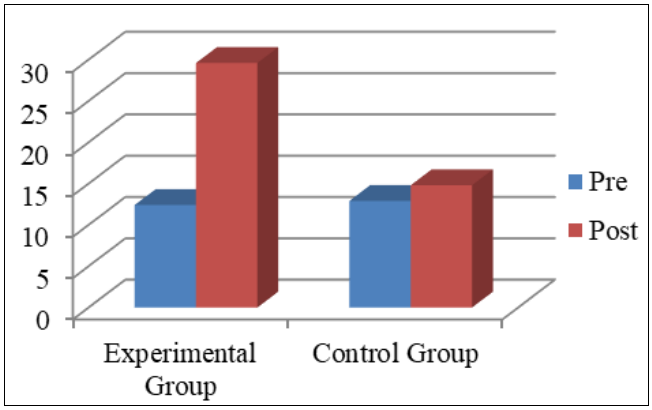

Fig 2: Bar diagram showing the Pre and Post-test means on Range of Motion

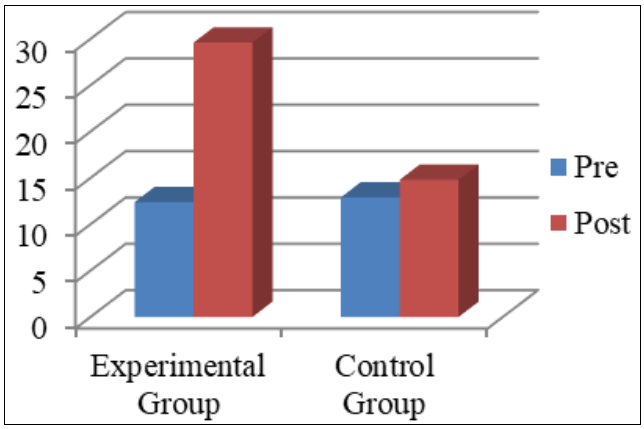

Fig 3: Bar diagram showing the Pre and Post-test means on Neck Flexor Index

Discussion and conclusion

The results of the present study showed that myofascial trigger point therapy and rehabilitative exercise interventions were most effective in reducing pain intensity, and improving the range of motion and neck flexor index compared with the control group. An important factor contributing to chronic upper cross syndrome might be the presence of trigger points that may lead to pain, muscular imbalances and impairment of kinaesthetic sensibility in subjects with chronic non-traumatic neck pain.

It would appear that manual and exercise therapy are complementary to each other, providing additive benefits in terms of pain relief. Both intervention techniques appear to have pain-modulating properties that may have some neurophysiological basis. Improvement in upper cross syndrome following muscle training denotes enhancement of physical support for the cervical vertebra column due to improvements in activation, strength, endurance, fatigability and proprioceptive acuity of the cervical muscles and spine (O'leary, *et al*., 2009) [9]. Buttagat *et al*. (2016) [1] found significant improvements in pain intensity after patients with myofascial pain in the scapular area were administered scapular stabilizing exercises. In agreement with previous studies, the control group showed significant positive changes on all outcome measures such as pain intensity, joint relocation error and disability level. These changes following only 6 weeks of cranio cervical flexor exercise may be associated with neuromuscular adaptations such as greater synchronization of motor units, altered sensitivity of muscle receptors and reduced recruitment of non-primary muscles (O'leary, *et al*., 2007) [10]. Jason Schliesser, *et al*. (2003) [5]. Conducted a study on effect of manual therapy for cervical pain. In this, they included 39 patients. The VAS was used to objectively quantify pain. This study revealed a statistically significant reduction in pain as quantified by visual analogue scores. There are a number of previous studies on improving upper cross syndrome. Yang *et al*. (2007) [12] conducted a study on the effects of sling exercise on muscle tension and pain in subjects with upper cross syndrome.

It is concluded that the myofascial trigger point therapy and rehabilitative exercise interventions is an efficient method in reducing pain intensity, and improving the range of motion and neck flexor index in the upper cross syndrome.

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