

Effectiveness of isometric neck exercises and dynamic neck exercises in auto rickshaw drivers with non-specific chronic neck pain: A comparative study

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Abstract

The purpose of this study was to compare the effectiveness of isometric neck exercises and dynamic neck exercise in auto rickshaw drivers with chronic non-specific neck pain. 60 male auto rickshaw drivers who had chronic neck pain minimum above 7 weeks were randomly selected and were divided into two groups. Group A received Dynamic neck exercises and Group B received Isometric neck exercises with an elastic resistance theraband (Yellow theraband). The level of Pain and Neck Disability was measured using Neck Disability Index Scale (NDI) and Visual Analogue Scale (VAS) respectively pre and post intervention i.e. after 3 weeks intervention. There was significant improvement in both Dynamic neck exercises and Isometric neck exercises groups. Statistical comparison of the results showed that Group A had greater improvement in pain as well as in Neck Disability as compared to Group B. Dynamic neck exercise appeared to be more effective than isometric neck exercises to reduce neck pain and neck disability in auto rickshaw drivers.

Keywords: dynamic neck exercises, isometric neck exercises, neck disability, pain, NDI (Neck Disability Index) scale, (VAS) visual analogue scale and auto rickshaw drivers

1. Introduction

In modern industrialized countries Neck disorders remain a common problem. Neck pain may come from any of the structures in the neck which include muscles and nerves as well as the spine and the cushioning discs in between. It may also come from regions near the neck, like the shoulder, jaw, head, and upper arms^[1]. Muscle strain or tension which is caused by postural and mechanical strain is a common cause of neck pain. There are two types of neck pain associated with muscle tightness and the other with muscle strain in the posterior neck. Symptoms and treatment differ according to the underlying cause. Both types are quite prevalent; the pain associated with muscle tightness usually has a gradual onset of symptoms, while the pain associated with muscle strain usually has an acute onset^[1, 3]. Non-specific Neck Pain refers to neck pain (with or without radiation) whose underlying cause cannot be traced to any specific systemic disease. Neck pain found to be a common condition all over the world⁵. Auto rickshaw drivers are the major means of public transport in India^[6]. There is extensive studies quoting the fact that drivers are more prone to work related musculoskeletal disorders due to various factors like postural stress, exposure to vibration and so on. A habitual forward head posture during driving, invariable jolting and driving seat ergonomics are the main cause of neck pain reported in drivers^[6]. About 60-69% of professional drivers suffer from neck pain due to faulty postures of driving^[6]. Physiotherapy interventions commonly used in the treatment of neck pain are: Exercise therapy (neuromuscular training, strength training, and endurance

training). Manual therapy (massage, manipulation, mobilization). Electrotherapy (TENS, Low level LASER). According to The Cochrane Collaboration the above mentioned interventions have low evidence as well as no definite statements on the efficiency and clinical usefulness of these statements can be made. Exercise programmers for managing neck pain differ with regard to duration, training frequency, intensity, and mode of exercise^[7]. Stabilization exercises are exercises that are meant to maximize function, and prevent injury progression or re-injury. They require coordination and training of the anterior and posterior cervical and shoulder girdle musculature^[8].

1.1 Isometric exercise

Isometric exercise is a static form of exercise that occurs when a muscle contracts without an appreciable change in the length of the muscle or without visible joint motion. To improve the muscle strength and endurance isometric contraction should be held against resistance for at least 6 seconds^[9]. This allows time for peak tension to develop and for metabolic changes to begin to occur in the muscle with each contraction. Isometric exercise is commonly used to increase muscle performance. In isometric exercises no joint movement occurs, it is considered functional because it provides a strength base for dynamic exercise^[9].

1.2 Dynamic exercise

Dynamic Neck Exercises is progressive-resistive strength training that involves movement of other parts of the body and

neck. Strengthening exercises involve any exercise done by the individual/patient that includes resistance, for example isokinetic or isotonic [10]. It could include therabands, free weights, machines etc. Dynamic muscle strengthening occurs when muscles contract as they shorten (i.e., concentric contractions) or lengthen (i.e., eccentric contractions); resulting in movement of the joint they cross. Due to increased movement of the joint the capsular, ligament, and muscular flexibility is maintained and increased in cartilage nutrition. Muscle strengthening occurs in the entire joint ranges achieved during the exercise and results in a functionally more efficient muscle-joint complex [11].

2. Methodology

2.1 Purpose

The intention of the study was to compare the efficacy of isometric neck strengthening exercises and dynamic neck strengthening exercises in treating non-specific chronic neck pain in auto rickshaw drivers.

2.2 Selection of the subjects

To achieve this purpose of study 60 male auto rickshaw drivers between 20-60 years of age with chronic neck pain above 7 weeks were selected.

2.3 Procedure

Subjects were randomly divided into two groups: Group A received Dynamic neck exercises and Group B received Isometric neck exercises.

- **GROUP A (Dynamic neck exercises):** In this study, one group of thirty patients performed self- dynamic neck exercises which included lifting head up with the chin tucked in from supine lying for neck flexion, lifting head backwards in prone lying for neck extension, lifting head sideways from pillow in side lying position for neck side flexion which is also repeated for the other side and finally lifting head off from the bed and rotating to one side for neck rotation, repeating both ways. These exercises were performed for 8-10 repetitions on alternate days for 3 weeks.
- **GROUP B (Isometric neck exercises):** The other group of thirty patients performed self- neck isometric exercises with an elastic resistance band (Thera-band Yellow in color). Here the exercises were performed in sitting position, by holding the Thera-band directly forwards for neck flexion, backwards for neck extension and obliquely towards right and left and by crossing over the band for neck side flexion and rotation. All these were done for about 5-10 repetitions with a hold time of 6 seconds at 75% of elongation with 1.1Kilogram resistance offered by the Thera-band on alternate day for 3 weeks.

2.4 Findings

Pre and post analysis was done within group using paired t test which showed significant results.

Table 1: Showing the distribution of individuals in terms of their age group.

Age Group (YRS)	Group A	Group B
20-30	7	7
30-40	10	9
41-50	8	8
51-60	5	6
MEAN	38.6	40.2

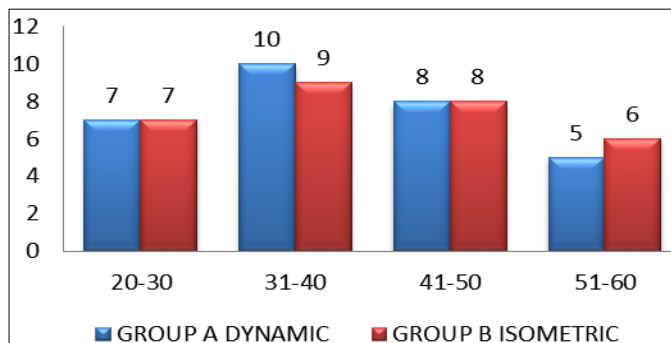


Fig 1

Interpretation

The group A receiving dynamic neck exercises consisting of 30 males. Group B receiving isometric neck exercises consisting of 30 males. Both these groups were matched in terms of age. (Table 1 and figure 1).

Table 2: Effect of intervention on visual analog scale

	Pre vas	Post vas	T value	P value	Sd	Result
Group a	5.86	2.8	20.29	<0.0001	7.94	Significant
Group b	6.56	4.66	21.65	<0.0001	8.98	Significant

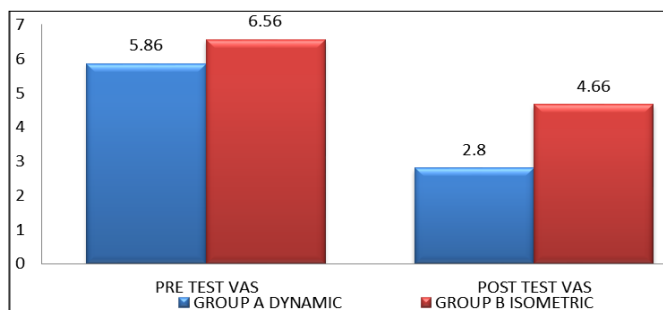


Fig 2: Comparison of pre and post using vas

Interpretation

Result revealed there was significant difference in group A and group B (Table 2 and figure 2).

Table 3: Effect of intervention on neck disability index

	Pre Ndi	Post Ndi	T value	P value	Sd	Result
Group a Dynamic	69	32.03	22.53	<0.0001	0.17	Significant
Group b Isometric	69.7	49.2	14.18	<0.0001	2.18	Significant

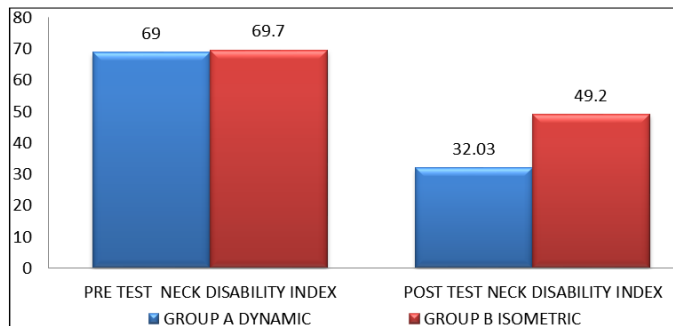


Fig 3: Comparison of pre and post intervention of neck disability index

Interpretation

Result revealed there was significant difference in group A and group B as showed. (Table 3 and figure 3)

Table 4: Comparison of group a versus group b on vas and neck disability index

	Group a Dynamic	Group b Isometric	T value	P value	Sd	Result
Vas	3.066	1.9	6.676	<0.0001	0.48	Significant
Ndi	36.96	20.56	7.489	<0.0001	0.82	Significant

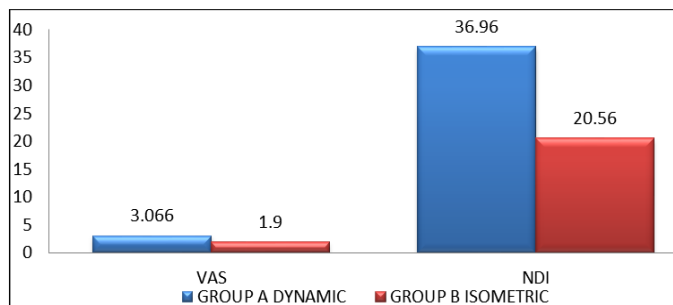


Fig 4: Comparison of vas and ndi on dynamic and isometric neck exercises in chronic neck pain

Interpretation

After comparing results of VAS and Neck Disability Index it was revealed that dynamic neck exercises is effective for chronic neck pain. (Table 4 and figure 4)

3. Results

Post data analysis shows that, GROUP A (Dynamic neck exercises) has shown significant improvement in reducing non-specific neck pain in auto rickshaw drivers on VAS (Visual Analogue Scale) and NDI (Neck Disability Index) scale as compared to GROUP B (Isometric neck exercises)

4. Discussion

The present study was done to find out the effectiveness of Dynamic neck strengthening exercises and Isometric neck exercises on non-specific chronic neck pain in auto rickshaw drivers. In this study 60 participants were included 30 in each group of age 20-60yrs.

The difference between the pre and post values of both the groups was statistically analyzed which showed significance. P value of all the outcome measures is <0.05. t value for VAS is (6.67) and for NDI is (7.48)

When both the groups were compared, we found out that Dynamic neck exercises has proven to be more effective as compared to isometric neck exercises. In dynamic neck exercises there is both eccentric and concentric contraction. Concentric muscle contractions can offer very high forces and thus an appropriate overload stimulus. Eccentric contractions can actually produce more muscular force than that obtained during an isometric muscle contraction. This helps to increased movement of the joint, resulting in maintenance of capsular, ligament, and muscular flexibility and increased in cartilage nutrition and thus reduces pain and disability. Within Group A when pre and post analysis was done we found that Dynamic neck strengthening has shown very significant statistical improvement in reducing non-specific chronic neck pain.

Berg HE *et al.* examine in their study whether dynamic neck resistance training could increase strength and reduce pain in workers with a high prevalence of neck disorders [13]. Apart from the fact that dynamic exercise has certain advantages than isometric exercise, some of the studies performed by Ylinen J, Ruuska J proved that, isometric strength measurement is a useful and a practical method of objectively showing a functional improvement in response to rehabilitation [14]. A similar study performed by Jari Ylien *et al.* in “ Active neck muscle training in the treatment of chronic neck pain in women” concluded that, both endurance training (dynamic neck exercises) and strength training (isometric neck exercises) were effective methods for decreasing the pain and disability in women with chronic, non- specific neck pain [15].

5. Conclusion

The results that are obtained show us that, dynamic neck exercises has proved to be much more effective method than isometric neck exercises in the treatment of patients with Non-specific chronic neck pain in auto rickshaw drivers.

6. References

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