

The role of multistep core stability exercise with and without conventional neck exercises in the treatment of chronic non-specific neck pain a randomized controlled trial

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(Received: February 2020 Revised: April 2020 Accepted: May 2020)

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ABSTRACT

Introduction and Aim: Neck pain is a common problem with two-third of the population having neck pain at some point in their lives. Chronic non-specific neck pain is related to limited cervical mobility, impaired function, and stress at work. This will occur for IT professions, mobile phone users, and people who are maintaining poor posture in their occupations in daily life. This study is to analyse the effectiveness of core stability exercise. The aim of our study was to analyse the efficacy of multistep core stability exercise with and without conventional neck exercises in the treatment of chronic non-specific neck pain a Randomized Controlled Trial.

Methodology: This comparative study of pre-post type was conducted in OPD of physiotherapy at A.C.S. medical college and hospital and took 3 months to complete the study. A total number of 40 samples were selected from 70 volunteers based on the inclusion criteria. GROUP A received neck stability exercise and GROUP B received neck stability and core stability exercises. Both the groups received exercises for 45 min session per day for 6 days a week for 12 weeks. Pre and post-test measured using VAS, NDI, CCFT. Both the group received a hot pack for 10min as a common intervention.

Results: On comparing the mean value of Group A & Group B on VAS and NDI Group B (neck stability with core stability exercise) showed 3.5 and 33.4 post-test values which were more effective than Group A (neck stability exercise) 5.3 and 45.2 at $P \leq 0.001$. On the Craniocervical flexion Group B had shown 29.5 greater mean value when compared to Group A 24.7 at $P \geq 0.001$.

Conclusion: Higher proportions of patients improved in group B compared to group A. Core stability exercise group demonstrated and benefited significant improvements in NDI, VAS, and CCFT scores.

Keywords: Chronic non-specific neck pain; neck stability; core stability exercise; VAS; NDI; craniocervical flexion test; RCT.

INTRODUCTION

Neck pain is a common problem in the world, affecting approximately 70% of people at some point in their life (1). Non-specific neck pain is defined as pain in the posterior and lateral aspect of the neck between the superior nuchal line, and the spinous process of the first thoracic vertebra with no signs or symptoms of major structural pathology and no or minor to major interference with activities of daily life and also the absence of neurological sign and specific pathologies. Pain symptoms appear to be worsened during prolonged static muscle activity and repetitive job tasks (2). Studies have identified impaired activation of the deep cervical flexor muscle, the longus colli and longus capitis in people with neck pain (3). Many people experience soreness of the neck/ shoulder muscle after prolonged computer work. The soreness present in different neck/ shoulder muscles, for example, the trapezius levator scapulae, neck extensors, and infraspinatus (4).

Nonspecific neck pain is multifactorial it includes poor posture and sporting or occupational activity (5). Neck pain may be a major public health problem

both in forms of personal health and overall wellbeing. Neck pain is a common symptom within the population. The prevalence period and generally women have more neck pain than men (6). The prevalence of neck pain in the community has been researched less extensively in the United Kingdom (7). Cross-sectional studies consistently report that the prevalence of neck pain increases with age. The higher prevalence of neck pain in older individuals and women suggest that the prognosis of neck pain varies with age and gender (8). The estimated 1-year incidence of neck pain from available studies ranges between 10.4% and 21.3% with a higher incidence noted in office workers. The overall prevalence of neck pain in the general population ranges between 48% to 79.5%. Prevalence is higher in high-income countries compared with low and middle-income countries. Neck pain is more among urban areas of the country (9). The worst ergonomics may create neck pain among the workers in various fields. Ergonomic intervention is based on reducing awkward posture that occurs at the work station while performing work tasks. A physical therapist has unique knowledge and training in identifying

awkward posture by performing the appropriate test and measures (10) Cervical and scapular stretching have been found to provide intermediate-term relief for mechanical neck pain. Clinical trials have found that exercises are beneficial for neck pain, and it relaxes the neck muscles (11). Isometric exercise is used as a special technique in proprioceptive neuromuscular facilitation to improve the endurance and strengthen the muscle. An isometric exercise is a static form of exercise that occurs when a muscle contracts without any change in length of the muscles or without visible joint motion. It is most effective when individuals are in a low state of training (12).

Endurance training has also shown a statistically significant improvement, however lesser the significant than the motor control exercise group (13). The study concludes that, there seems to be evidence that endurance exercise is more beneficial in a general exercise program in reducing neck pain and seems to be advantageous (14) The study concluded that samples in neck stabilization and postural correction showed better significance than stretch and strengthening exercise in reducing pain and disability and improving posture and breathing pattern (15). This systematic review of maximum studies showed that, there was some improvement in neck functional abilities and reduction in neck pain in the endurance training group (16). The study concluded that the postural alignment achieved from the Schroth method is better than that achieved by yoga (17).

The visual analog scale has been studied predominantly in connection with the pharmacological treatment of pain. It is considered as one of the best methods for the estimation of pain. VAS has a high degree of sensitivity and discrimination capacity superior to that of another scale (18). The NDI is a reliable comprehensively validated and clinically useful tool to measure disability due to neck pain (19). Neck disability index is the most used and validated instrument to assess the impact of neck pain in the patients. The NDI questionnaire has been translated properly and used in different languages, and the social environment (20). Most studies suggest that the NDI has acceptable reliability, and also intraclass correlation. Coefficient range from 0.50 to 0.98. The NDI has sufficient support and usefulness measure for neck pain (21).

The reduced performance of the Cranio-cervical flexion test is associated with dysfunction of the deep cervical flexor muscle, and support the validity of the test for a patient with neck pain (22). Activation and isometric endurance of deep cervical flexors, and also their interaction with the superficial cervical flexors during the performance of the five-progressive stage of increasing the Craniocervical flexion range of motion. The construct validity of the CCFT has been

verified by direct measurement of a deep and superficial flexor muscle activity. The patient with neck pain disorders has been reduced activity in the deep cervical flexors. In the retraining of deep cervical flexor muscles for neck pain patients shows positive therapeutic benefit when tested in a clinical trial. The test was initially used in the clinical setting and observation of the inability of the patient with neck pain to perform the test and the positive clinical response to training the action (23).

METHODOLOGY

Once the study gets approved from the Institutional Review Board, 40 samples were selected from 70 volunteers based on the inclusion criteria. The study included samples with inclusion criteria and excluded those with exclusion criteria. The subjects were fully explained about the study and the questionnaires were filled. They were then asked to fill the consent form in acceptance to participate in the study, which is duly signed by the samples and therapist. Initially, demographic details like age, gender were collected assuring confidentiality. The samples were then divided into two groups by computer-generated randomization. 20 samples of group A received neck stability exercises and 20 samples of group B received neck stability and core stability exercises. Both the group received exercises for 30 mins of 1 session per day for 4 days in a week till 4 weeks. After 4th week the exercises were done for 40 mins of 1 session per day for 6 days in a week till 8th week. After the 8th week, the exercises were done for 30 mins of 2 sessions a day for 6 days a week till 12th week. Each exercise was repeated for 5 times. Pre and post-test measures were done using VAS, NDI, and CCFT. Both the groups received hot packs for 10 mins session as a common intervention. Group-A: Neck Stability Exercises-Free exercise for cervical spine, Neck isometric exercises (flexion, extension, lateral flexion, rotation), Wall angle exercises for lower trapezius, Chin tuck, Chin tuck into the towel, Ball exercise, Lateral flexion and extension using a ball. Group-B: Core stability exercises, Dead bug track, Bridge track, Side bridge track, Side-lying track, Prone track.

Statistical analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using the statistical package for social science (SPSS) version 24. A paired t-test was adopted to find the statistical difference within the groups & an independent t-test (students t-test) was adopted to find statistical differences between the groups.

RESULTS

On comparing the mean values of group A and group B on VAS, it showed a significant decrease in the post-test mean value but (group B neck stability with

core stability exercises) showed 3.5 which has the lower mean value and is more effective than (group A neck stability exercise) 5.3 at $P \leq 0.001$. Hence, the null hypothesis is rejected.

The mean values of group A and B on NDI were compared which showed a significant decrease in the post-test mean value but (group B neck stability with core stability) shows 33.4 which has a lower mean value is more effective than (Group A neck stability exercise) 45.2 at $P \leq 0.001$. Hence, the null hypothesis is rejected.

On comparing the mean value of group A and group B on Craniocervical flexion test, it shows a significant decrease in the post-test mean value but (group B neck stability and core stability exercise) shows 29.5 which has the greater mean value is more effective than (group A neck stability exercise) 24.7 at $p \geq 0.001$. Hence, the null hypothesis is rejected.

Pre-test and post-test within group A and group B on VAS, NDI, and Craniocervical flexion tests were compared and were found to be highly significant in mean value at $p \leq 0.001$.

Table 1: Comparison of vas between group A and group B in pre-test and post test values

#VAS	Group A		Group B		t - Test	df	Significance
	Mean	S. D.	Mean	S. D.			
Pre-test	6.6	0.48	6.4	0.66	1.056	38	0.297
Post test	5.3	0.65	3.5	0.67	8.336	38	0.000***

(***- $P \leq 0.001$)

Table 2: Comparison of NDI between group A and group B in pre-test and post test values

#NDI	Group A		Group B		t - Test	df	Significance
	Mean	S. D.	Mean	S. D.			
Pre-test	50.0	7.34	50.6	7.10	0.255	38	0.799
Post test	45.2	7.98	33.4	5.25	5.380	38	0.000***

(***- $P \leq 0.001$)

Table 3: Comparison of craniocervical flexion between group A & group B in pre -test and post test values

#CCF	Group A		Group B		t - Test	df	Significance
	Mean	S. D.	Mean	S. D.			
Pre-test	22.7	2.02	22.6	1.56	2.55	38	0.799
Post test	24.7	1.81	29.5	4.42	4.376	38	0.000***

(***- $P \leq 0.001$)

Table 4: Comparison of VAS within group A and group B in pre-test and post test values

#VAS	Pre-test		Post test		t - Test	Significance
	Mean	S. D.	Mean	S. D.		
Group A	6.6	0.48	5.3	0.65	12.36	0.000***
Group B	6.4	0.66	3.5	0.67	20.24	0.000***

(***- $P \leq 0.001$)

Table 5: Comparison of NDI within group A and group B in pre-test and post test values

#NDI	Pre-test		Pre-test		t - Test	Significance
	Mean	S. D.	Mean	S. D.		
Group A	50.0	7.34	45.2	7.98	8.168	0.000***
Group B	50.6	7.10	33.4	5.25	17.03	0.000***

(***- $P \leq 0.001$)

Table 6: Comparison of craniocervical flexion within group A and group B in pre-test and post test values

#CCF	Pre-test		Pre-test		t - Test	Significance
	Mean	S. D.	Mean	S. D.		
Group A	22.7	2.02	24.7	1.81	9.74	0.000***
Group B	22.6	1.56	29.5	4.42	25.84	0.000***

(***- $P \leq 0.001$)

DISCUSSION

The core stability training decreased the neck pain and disability, while the endurance of neck muscles increased in both the group. Additionally, there was a similar improvement in pain activation and the static endurance of DCF muscles and neck muscles and disability in both groups. When the literature is

received it is seen that cervical stability training improves the clinical outcomes in patients with neck pain. Therefore, it is necessary to develop a proper posture not only in the cervical region but throughout the spine inpatient with neck pain.

Core stability training is based on the knowledge that the strength and endurance of DCF muscles are

reduced in individuals suffering from neck pain (24). Moreover, it is reactivating DCF muscles and reorganization of motor control and normalization of superficial muscles level in neck pain resulting in improved clinical outcomes (25).

CONCLUSION

Though the disability and pain scores were reduced significantly in both the groups, the post-intervention scores between groups were found significant in group B. This indicates that core stability exercises were superior to conventional physiotherapy exercises in terms of reducing pain and disability. Higher proportions of patients improved in group B compared to group A. Core stability exercise group demonstrated and benefited significant improvements in NDI, VAS, and CCFT scores.

Ethical Considerations: The manuscript is approved by the Institutional Review board of faculty of physiotherapy (IRB REF NO: IV C- 032/ PHYSIO/ IRB/201-2019).

Source of funding: Nil, This is a self-funded study.

ACKNOWLEDGEMENT

We would like to thank the authorities of Dr. MGR Educational and Research Institute, University and the Principal Faculty of Physiotherapy for providing me with facilities required to conduct the study.

CONFLICT OF INTEREST: None

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