

Effects of cervical stabilisation exercises on respiratory strength in chronic neck pain patients with forward head posture

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Abstract

The objective of this study was to determine the effects of cervical stabilisation exercises on respiratory strength in chronic neck pain patients with forward head posture. The study was conducted from August 2020 to February 2021, at the Jinnah Hospital, Lahore; 44 patients who fulfilled the eligibility criteria were randomly assigned to two groups-experimental group and control group. Baseline measurement was taken for numeric pain rating scale, neck disability index, craniovertebral angle, single breath count, and spirometry and all the measurements were retaken at the completion of the fourth week. Results were not significant ($p>0.05$) before the treatment in both groups but post-intervention results revealed significant differences in both the groups ($p<0.05$), with the experimental group showing more improvement. Four weeks of cervical stabilisation with isometric exercises is more effective in the management of pain, forward head posture, neck disability and respiratory strength as compared with the four weeks of isometric exercises programme alone.

Keywords: Stabilisation, Neck pain, Posture, Respiratory strength.

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Introduction

Neck pain is a worldwide health issue with annual preponderance ranging between 30% and 50%. It is the most common musculoskeletal problem in today's life due to extensive use of electronic gadgets.¹ Forward head posture (FHP) triggers morphological changes in the thorax. It instigates contraction of lower thorax and expansion of the upper thorax. These changes lead to decreased respiratory function.² Normal craniovertebral angle (CVA), according to medical literature, is more than 50° and an angle of less than 50 indicates forward head posture. There is an important correspondence between cervical spine pain and FHP. Smaller CVA specified more forward posture.³ A study was planned by Lee H. and his

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colleagues to assess and compare efficacy of neck stabilisation exercises with strengthening exercises in people with persistent neck pain. The study suggested that strengthening and stabilisation exercises programme were more beneficial for treating chronic neck pain.⁴ Stabilisation exercises with manual therapy had better results than simple stabilisation exercises as suggested by Celenay S.T. in one study for improving the intensity of pain, neck disability, and range of motion of cervical spine.⁵

As there is a lack of research in this area, the current study was conducted to reveal the significance of cervical stabilisation exercises on chronic cervical pain, forward posture, neck disability and respiratory strength weakness.

Patients/Methods and Results

This study was carried out at the Physiotherapy Department, Jinnah Hospital, Lahore, between March 27, 2020 to February 01, 2021 after approval of the research ethical committee, Ref. No. REC/RCRS/20/1048. The study was clinically registered by ClinicalTrials.gov ID: NCT04674891. The sample size was 44, calculated by online EpiTools sample size calculator.⁴ After getting approval from the hospital's administrative department, prospective participants were recruited by convenience non-probability sampling technique. Patients (both male and female) between 18 and 55 years of age with neck disability index-Urdu score (5-15) mild neck disability, forward head posture with craniovertebral angle (CVA $<50^\circ$) and cervical pain for at least three months⁶ were included in the study, while patients with traumatic neck pain, thoracic or vertebral column surgery, BMI of more than 30, smoking history or any red flag signs were excluded from the study. Once the conditions for inclusion and exclusion were determined, the prospective participants were considered. They were asked to participate in the study. Informed written consent was taken from each participant. The participants were allocated to two groups — group A (experimental group) and group B (control group) — by lottery method. It was a single blinded study; the patients were blinded regarding their treatment group allocation. The baseline measurement was taken, forward head posture was evaluated by digital camera, Craniovertebral angle measured by Autocad software,⁷

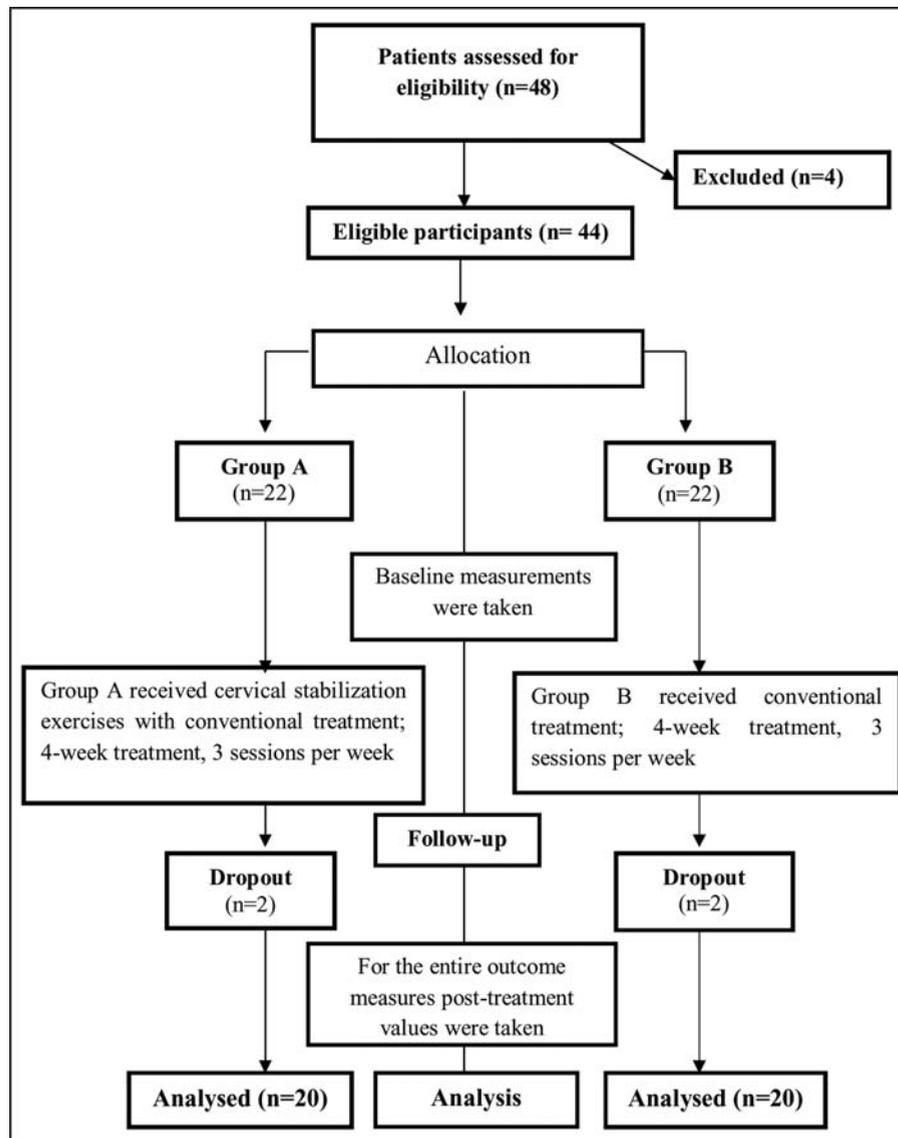


Figure: Consort flow chart.

respiratory strength was measured by single breath count,⁸ and spirometry.⁹ Pain level was measured by numeric pain rating scale (NPRS) and disability was measured by neck disability index-Urdu (NDI-U). All the measurements were retaken at the completion of the fourth week. Treatment protocol was of four weeks duration which included three sessions per week. Group A was experimental Group and received cervical stabilisation exercises (Pillow was placed beneath the cervical spine in supine position and the patients were guided to nod the head in cervical flexion and hold for 10 seconds, 10 repetitions) and conventional treatment (Heating pad for 15 minutes), TENS (Transcutaneous Electric Nerve Stimulation) burst-mode, intensity of 10-30mA with frequency 80Hz for 10 minutes, Cervical isometric exercises in sitting position by resisting

forehead in cervical flexion, extension, side bending and rotation (10 seconds hold, 10 repetitions). Group B was the control group which received only conventional treatment (Heating pad for 15 minutes, TENS (Transcutaneous Electric Nerve Stimulation) burst-mode, intensity of 10-30mA with frequency 80Hz for 10 minutes, Cervical isometric exercises in sitting by resisting forehead in cervical flexion, extension, side bending and rotation (10 seconds hold, 10 repetitions) (Figure).

Data was analysed by using SPSS version 25, Shapiro-Wilk test was used to check the normality of data, Shapiro-Wilk test range for CVA, NPRS and NDI was greater than (0.05) so parametric test were applied for these variables. Values of SBC and spirometry of Shapiro-Wilk test was below (0.05) and indicated that the data was not normally distributed and non-parametric tests were applied. Comparison among the groups was done by Independent samples t-test for CVA, NPRS and NDI and Mann-Whitney test was applied for SBC and spirometry. Out of the 44 patients included, 40 patients completed the study, i.e. 20 patients in each group. The mean age of Group A was 29.95 ± 6.0 years with mean BMI of 24.71 ± 2.52 kg/m². Eight (40%) males and 12 (60%) females were

allocated to Group A. The mean age of Group B was 32.65 ± 10.6 years with mean BMI of 22.50 ± 3.09 kg/m². Four (20%) males and 16 (80%) females were included in Group B. Group A showed CVA pre-mean= 47.4 ± 1.81 , post-mean= 50.9 ± 1.41 , NPRS pre-mean= 4.90 ± 1.65 , post-mean= 1.35 ± 0.933 , NDI pre-mean= 9.35 ± 2.796 , post-mean= 3.85 ± 2.434 , SBC (pre-median= 2.50 , IQ range= 1 , post-median= 3.00 , IQ range= 0 and spirometry pre-median= 3.00 , IQ range= 1 , (post-median= 3.00 , IQ range= 0). Group B showed CVA pre-mean= 46.9 ± 2.0 , post-mean= 49.0 ± 1.62 , NPRS pre-mean= 5.70 ± 1.658 , post-mean= 2.40 ± 1.273 , NDI pre-mean= 10.30 ± 2.849 , post-mean= 7.15 ± 2.681 , SBC pre-median= 2.50 , IQ range= 1 , post-median= 3.00 , IQ range= 1 and spirometry pre-median= 2.00 , IQ range= 1 , post-median= 3.00 , IQ range= 1 .

Table-1: Group Comparison using Independent T-test.

Groups	Variables	p-value	
		Baseline	Post-treatment
Experimental group (A)	CVA	0.410	<0.001
	NPRS	0.134	<0.001
	NDI	0.294	<0.001
Control group (B)	CVA	0.409	<0.001
	NPRS	0.134	<0.001
	NDI	0.294	<0.001

[CVA=Craniocervical angle, NPRS=numeric pain rating scale, NDI=neck disability index].

Table-2: Group Comparison using Mann-Whitney U Test.

Groups	Variables	p-value	
		Baseline	Post-treatment
Experimental group (A)	SBC	0.764	0.3
	Spirometry	0.655	0.09
Control group (B)	SBC	0.7	0.31
	Spirometry	0.6	0.09

[SBC=single breath count].

Table-1 shows comparison of experimental and control groups by applying independent sample t-test. At the baseline tools CVA, NPRS and NDI showed non-significant values but after treatment both the groups showed significant improvement. Table-2 shows group comparison of both the groups using Mann-Whitney U test. Values of variables SBC and spirometry were non-significant before the treatment. Post-treatment spirometry showed positive improvement but SBC displayed non-significant results in both the groups after treatment. P-values were not significant ($p>0.05$) at baseline in both the groups but post intervention results revealed significant differences in both the groups ($p<0.05$) except SBC. Mean values of group A, on which cervical stabilisation exercises were applied, showed more improvement than group B.

Discussion

The following parameters, i.e. age, gender, BMI, CVA, NDI, NPRS, SBC and spirometry, were included in the current study to measure the levels of neck disability, FHP and respiratory dysfunction in patients with chronic neck pain. The purpose of this research was to evaluate the effects of cervical stabilisation exercises. To prove the effects of cervical stabilisation and conventional treatment, both the groups showed significant improvement after treatment in managing pain, improving forward head posture, decreasing disability and improving respiratory strength and function but if mean values among the two groups were considered then it revealed that post-treatment mean values of

Group A, treated with cervical stabilisation exercises and conventional treatment, showed a significant improvement than Group B, which was the control group. A study by Lee H. and his colleagues suggested that both strengthening and stabilisation exercises programme and strengthening exercise programme are beneficial for treating chronic neck pain. However, stabilisation and strengthening programme might be superior in strengthening cervical flexors and improving the range of motion of cervical spine as compared to strengthening programme alone.⁴ The current study is in accordance with the study conducted by Celenay et al, which suggested that for improving intensity of pain, neck disability and range of motion, stabilisation exercises with manual therapy had better results than simple stabilisation exercises.⁵ A study was conducted on post-stroke patients to investigate the effects of cervical stabilisation exercises on respiratory strength. The authors concluded that cervical stabilisation exercises with respiratory muscles training had admirable effects on respiratory muscles function in post-stroke patients.¹⁰ Results of the current study showed that cervical stabilisation exercises significantly improved neck pain, forward head posture and respiratory strength.

Conclusion

Cervical stabilisation for four weeks with isometric exercises is more effective in the management of pain, forward head posture, neck disability and respiratory strength as compared with four weeks of isometric exercises programme alone.

Limitations: People from limited area participated. Further research can be conducted on higher levels including different areas and more subjects.

Disclaimer: None.

Conflict of Interest: None.

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