



Effects of Mckenzie Exercises with and without Bruegger's Relief Exercise on Cervical Flexion-Extension and Endurance of Deep Neck Flexors in Patients with Text Neck Syndrome

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KEYWORDS

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DECLARATIONS

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ABSTRACT

Background: The term text neck syndrome is a condition which develops in mobile phone users due to excessive usage that puts a load on the flexor muscles of the neck because the upper back is being held in flexion for a prolonged period. This syndrome is characterised by pain, soreness and stiffness in neck muscles and an increased risk of potential damage to neck structures resulting in abnormal cervical spine curvature. **Objective:** To compare the effects of McKenzie exercises with and without Bruegger's relief exercises on the range of motion and endurance of deep neck flexors in patients with text neck syndrome. **Methodology:** This study was a Randomized clinical trial conducted over three months from March to April 2024 with a sample size of thirty-four participants. Data was selected through non-probability convenient sampling from the Government College University, Faisalabad. However, Informed consent was taken from participants. Neck disability index, universal goniometer for flexion and extension, smartphone addiction scale-short version and neck flexion endurance test were used for pre-assessment and post-assessment was done by disability index, goniometer and neck flexion endurance. Patients were allocated randomly into two groups. Group A received Bruegger's relief exercise along with Mckenzie's exercises and Group B received only Mckenzie exercises for a total of 6 weeks having 5 sessions per week. **Results:** Results have shown Bruegger's exercise with McKenzie to be effective for the improvement of neck flexion endurance and flexion of the cervical spine with p-values <0.01 and <0.05 respectively. However, there was no significant difference between the two groups on the effects of cervical extension and neck disability index (p>0.05). **Conclusion:** It was concluded that both groups of McKenzie alone and Mckenzie with Bruegger exercises had similar effects on cervical extension range of motion and disability index score of neck while Mckenzie with Bruegger had a significantly greater effect on neck flexion endurance and cervical flexion range of motion.

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INTRODUCTION

In the modern era, the use of handheld devices is becoming more common. Using too much of electronic gadgets and devices will lead to prolonged neck flexion, and it causes neck pain in most of the population. Ultimately, this causes the neck muscles to be sore, aching and tightness of shoulder muscles and even headaches which may end up as chronic headaches.¹ If this condition is not treated and cured promptly, it may also result in bad posture and even long-term spinal concerns.² Cell phone users use the mobile phones holding them below their eye level, looking down in a forward position and using the thumb to touch the display screen. The outcome is Text Neck posture which is also called turtle neck posture.³

Research studies carried out in two regions of India and Pakistan showed the rampancy of text neck syndrome at 43.6% and 42.5%, respectively.⁴ The distortion of posture in the neck and head is found among the 2 types of persons: the 1st one is when you keep your head hung down for a prolonged period in neck flexion and the 2nd type is when the upper cervical spine is in extension and lower cervical spine in flexion.⁵ Due to this upper cervical, the elongation of the sub-occipital muscles, and facet joints to unweight, and elongation and stretching of the posterior ligaments occur. With time, the incompetence and stretching of these ligaments may lead to upper cervical instability.⁶ The more time spent using screens and handheld devices, the more pain one experiences in the cervical spine.

This results in decreased proprioception during cervical spine flexion.⁷ While using hand-held electronic gadgets and devices, the increased neck flexion may cause a decrease in the angle of cervical lordosis. For cervical lordotic angles, it should be in the range of 20 to 35 degrees. If this angle is less than 25 to 35 degrees, this curvature causes the cervical spine to seem flattened, which interferes with the neck musculature's normal function and increases the risk of disc herniation and degeneration. An HHMD is usually placed below eye level, which causes the neck to flex excessively, diminishing the natural cervical lordosis and producing this flattened cervical posture.⁸ It causes your neck to bend more than it should, which messes with the normal balance of your muscles and ligaments makes your neck less stable, and results in a poor effect on the length-tension relationship of the back muscles of the

neck. This causes abnormal movement between vertebral segments, which can lead to disc herniation.⁹ It's crucial to engage the deep cervical muscles to prevent overusing the superficial muscles. The imbalance of superficial and deep neck muscles is common in patients with persistent neck discomfort, which further encourages forward head posture. Patients experiencing neck pain were assigned to an exercise regimen designed to activate the deep neck flexors, which include the longus colli and capitus muscles. The study's findings demonstrated notable gains in scores of NDI, pain, and posture measurements in the group of deep cervical flexor training.¹⁰

Conservative management and symptomatic treatment can help alleviate the pain of the neck, on the other hand, many physiotherapy and advanced techniques can be used to treat text neck syndrome. Symptoms can be alleviated through various methods: Neck Muscle Warm-Up and Stretching exercises, Rest and posture improvement, Massage and hot/cold therapy, and pain relief medications³. One of the most widely used methods for diagnosing and treating people with neck discomfort is the McKenzie method.¹¹ McKenzie's approach can be referred to as mechanical therapy for spine mechanical problems. Progress in symptom relief is progressively evaluated in terms of "centralization". It integrates repetitive end-range movements through inspection.¹² Bruegger's exercise is particularly helpful for individuals who spend prolonged periods sitting or engaging in activities that promote a hunched-forward position. Encouraging the deep neck flexors to contract, builds stability and strength. Bruegger's exercise helps retrain muscle memory, making good posture a natural habit.¹³

METHODOLOGY

This study was a Randomized clinical trial conducted over three months from March to April 2024 with a sample size of thirty-four participants. Data was selected through non-probability convenient sampling from the Government College University, Faisalabad. However, Informed consent was taken from participants. Neck disability index (NDI), Goniometer for flexion and extension (ROM), Smartphone addiction scale-short version (SAS-SV) and Neck flexion endurance test were used for pre-assessment and post-assessment was done by NDI, goniometer and neck flexion endurance. Patients were allocated randomly into

two groups. Group A received Bruegger’s relief exercise along with Mckenzie’s exercises and Group B received only Mckenzie exercises for a total of 6 weeks having 5 sessions per week. Bruegger’s relief exercises were performed by asking the patient to be in a high sitting position with an erect posture.

An elastic resistance band was wrapped around each hand. The patient was asked to extend and abduct the thumb, flex the elbow, extend the wrist and supinate forearms. Then the patient was instructed to perform scapula retraction while tucking the chin in, extending elbows, abducting and extending shoulders. The position was maintained for 10 to 30 seconds. Mckenzie’s exercises were divided into 7 movements: 1) cervical extension while chin tucks in a sitting position 2) cervical extension while chin tucks in a supine position 3) cervical extension in sitting 4) cervical extension in lying while the head is out of bed 5) cervical extension with lateral flexion to both sides 6) rotate head to both sides with cervical extension 7) cervical flexion while the chin is tucked. Each exercise was maintained for 10 seconds.

RESULTS

The p-value is less than 0.05 for post values of both groups which indicates that the results are

significant. The difference between the mean and standard deviation of pre and post-values of cervical flexion ROM shows that Group A had more effective results than Group B. The difference between the mean and standard deviation of pre and post-values of cervical extension ROM shows that both Group A and Group B had almost the same results. The difference between the mean and standard deviation of pre and post-values of the neck flexion endurance test shows that Group A had more effective results than Group B. The difference between the mean and standard deviation of pre and post-values of the neck disability index score shows that both Group A and Group B had almost the same results.

DISCUSSION

This study aims to determine the effect of McKenzie’s exercises in addition to Bruegger’s exercises on the condition of text neck syndrome for the enhancement of cervical range of motion, the endurance of flexor muscles and overall function. After interpreting the results of this study by the independent sample t-test, which was done for between-group comparison analysis, the cervical extension and neck disability index scores were found to have a similar level of improvement by both exercises or McKenzie alone (p>0.05). However, the cervical flexion endurance time

Table 1: Independent t-test for cervical flexion ROM between groups

Cervical Flexion ROM	Groups of participants	N	Mean	Standard Deviation	p-value
Pre-treatment	Group A	17	34.94	3.614	0.501
	Group B	17	33.94	4.867	
Post-treatment	Group A	17	50.41	7.001	0.045
	Group B	17	46.12	4.807	

Table 2: Independent t-test for cervical extension ROM between groups

Cervical Extension ROM	Groups of participants	N	Mean	Standard Deviation	p-value
Pre-treatment	Group A	17	30.06	5.517	0.404
	Group B	17	31.59	5.013	
Post-treatment	Group A	17	45.12	5.243	0.325
	Group B	17	43.29	5.382	

Table 3: Independent t-test for neck flexion endurance test (time in seconds)

Neck Flexion Endurance Test	Groups of participants	N	Mean	Standard Deviation	p-value
Pre-treatment	Group A	17	30.529	10.2720	0.005
	Group B	17	23.000	4.9497	
Post-treatment	Group A	17	42.294	9.4985	<0.001
	Group B	17	30.471	7.5259	

Table 4: Independent t-test for neck disability index score of participants

Neck Disability Index Score	Groups of participants	N	Mean	Standard Deviation	p-value
Pre-treatment	Group A	17	12.41	4.094	0.359
	Group B	17	11.29	2.779	
Post-treatment	Group A	17	9.65	2.714	0.126
	Group B	17	8.29	2.285	

showed more improvement in the McKenzie and Bruegger group rather than in the McKenzie group alone ($p < 0.05$). Whereas for a within-group analysis by paired sample t-test, we found statistically significant results across both groups in terms of cervical extension/flexion, endurance time and NDI. This study’s results have shown Bruegger’s exercise to be effective for the improvement of neck flexion endurance and flexion of the cervical spine with p-values < 0.01 and < 0.05 respectively. The result is favoured by a previous study which was done in 2022 on muscles, and pain and craniocervical angle comparing McKenzie technique with craniocervical flexion exercises. After six weeks, the results found both of the exercises to be showing improvements across all the outcome variables ($p < 0.05$). This is somehow favouring the current study as the current study also found improvement in cervical flexion endurance with McKenzie protocol but less than that of Bruegger’s protocol and NDI have improved equally in both groups.¹⁵ GS Malode carried out a study in 2023 for a comparison between Pilates and Bruegger’s. All the subjects were with forward head posture along with temporomandibular joint dysfunction.

Post values showed statistically significant results in reducing pain, ROM, CVA and other functional improvements (with $p < 0.001$). But this study was

forward head posture patients by Ashma Chondankar and others to show a comparison between Bruegger’s and training deep cervical flexors. The result analysis showed that endurance of craniocervical flexion and craniocervical angle increased in both groups but the ones in Bruegger’s group were able to maintain their craniocervical angle and flexion endurance for a time longer than the ones in the deep cervical flexor training group ($p < 0.002$).¹⁴ Sawita C and Rotsalai K did a research study in 2024 on the effects on neck disability, endurance of flexor neck in contrast with our current study because the bruegger’s technique was less effective.¹⁶ Gera C, Lamba S et al. conducted a study in 2023 on patients of upper crossed syndrome comparing McKenzie and Thera band exercises in which the outcomes to measure were posture, pain and strength in subjects. Using paired and independent t-tests results were analyzed and statistically significant results were obtained in pain and disability in group A and group B ($p = 0.001$). However, the independent t-test showed that the exercise group was better than the McKenzie group.¹⁷

CONCLUSION

It was concluded that both groups of McKenzie alone and McKenzie with Bruegger exercises had

similar effects on cervical extension range of motion and disability index score of the neck while Mckenzie with Bruegger had a significantly greater effect on neck flexion endurance and cervical flexion range of motion. It is recommended that heavy mobile phone users especially students must include McKenzie and Bruegger exercises in their daily life to avoid neck pain due to prolonged usage of phones and enhance their functional performance. These exercises mainly Bruegger can also be used to improve neck flexor muscle endurance.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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