

EFFECT OF EYE-CERVICAL REHABILITATION PROGRAM ON PAIN AND CERVICAL PROPRIOCEPTION AMONG PATIENTS WITH TEXT NECK SYNDROME

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Abstract :

Background: Text neck syndrome is associated with prolonged forward-head posture and device use and may contribute to neck pain and impaired cervical sensorimotor control. Eye-cervical re-education integrates ocular and cervical movements to train cervical proprioception.

Purpose: To study the effect of an eye-cervical rehabilitation program on pain and cervical proprioception among patients with text neck syndrome.

Methods: This experimental pre-post clinical trial included 33 participants aged 20–50 years with neck pain of more than three months and clinical features consistent with text neck syndrome. Participants received a three-week intervention, three sessions per week, consisting of therapeutic massage, transcutaneous electrical nerve stimulation (TENS), and an eye-cervical re-education program (ECRP). Pain was assessed using the Visual Analogue Scale (VAS), and cervical proprioception was assessed using the Joint Position Error (JPE) test before and after intervention.

Results: Thirty-three participants completed the study. Mean VAS decreased from 6.00 ± 0.75 to 3.73 ± 0.80 , while mean JPE decreased from approximately $6.32-6.33 \pm 0.68-0.69$ to $4.61-4.64 \pm 0.68-0.69$. Within-group comparisons demonstrated statistically significant reductions in both outcomes ($p < 0.001$).

Conclusion: The intervention was associated with significant reductions in pain and improvement in cervical joint position sense in young adults with text neck syndrome. Larger controlled trials with longer follow-up are required to establish the independent effect of ECRP and the sustainability of these findings.

Keywords: Text neck syndrome; Eye-cervical re-education; Cervical proprioception; Joint Position Error; Visual Analogue Scale; Physiotherapy

I. INTRODUCTION

The cervical spine is a coordinated system of bones, joints, muscles and neural structures controlled by the brain and spinal cord. Prolonged use of smartphones, tablets and other handheld devices frequently places the cervical spine in a sustained forward-flexed position. This pattern, commonly described as “text neck,” has been associated with neck pain, upper-back discomfort, shoulder tightness and altered cervical movement patterns.^[1]

The increasing use of mobile devices has made prolonged screen exposure common in young adults. Sustained forward-head posture can increase mechanical loading of cervical and upper thoracic structures and may contribute to altered sensorimotor control. Cervical proprioception is important for accurate head and neck positioning and coordinated movement.^[7]

The Eye-Cervical Re-education Program (ECRP) is a proprioceptive training approach incorporating ocular mobility, cervical mobility, head repositioning and eye-head coordination. By integrating visual and cervical sensory inputs, ECRP may improve cervical joint position sense and functional cervical control.^[2]

II. NEED FOR THE STUDY

Text neck syndrome places increased demand on the deep cervical and upper-back musculature and may impair cervical joint and muscle biomechanics. Although several interventions have been used to address pain and postural problems associated with text neck syndrome, the available literature on strategies specifically targeting cervical proprioception is comparatively limited. Therefore, evaluating an eye-cervical rehabilitation approach may provide clinically useful information regarding pain and cervical sensorimotor control.

III. AIM AND OBJECTIVES

Aim: To study the effect of an eye-cervical rehabilitation program on pain and cervical proprioception among patients with text neck syndrome.

Objectives:

- To determine the effect of the eye-cervical rehabilitation program on pain in patients with text neck syndrome using the Visual Analogue Scale (VAS).
- To determine the effect of the eye-cervical rehabilitation program on cervical proprioception in patients with text neck syndrome using the Joint Position Error (JPE) test.

IV. MATERIALS AND METHODS

Study design and setting: The source project reports an experimental pre- and post-intervention clinical study with 33 participants. Data collection was conducted over six months through Miraj Medical Centre's College of Physiotherapy, Wanless Hospital, Miraj, and the Miraj–Sangli region.

Sampling and sample size: Simple random sampling was reported and the sample consisted of 33 participants.

Participants: Male and female participants aged 20–50 years with physician-diagnosed neck pain of more than three months and myofascial trigger points in the upper trapezius, levator scapulae and splenius capitis were included.

Exclusion criteria: Dizziness syndrome and post-traumatic, rheumatologic, neurological, infectious or tumour-related cervical pain.

Ethical considerations: Institutional ethics committee clearance was obtained and written informed consent was taken. Participants were informed about the study procedure, potential mild pain or fatigue, confidentiality, voluntary participation and their right to withdraw.

V. INTERVENTION PROTOCOL

Pain-management component: Therapeutic massage consisted of surface rubbing for 5 minutes, compression and kneading massage for 10 minutes, followed by 2 minutes of final surface friction. TENS was applied using 4 × 4 cm self-adhesive silicone electrodes, symmetrical biphasic rectangular current, 200 µs pulse width and 1 Hz frequency for 10 minutes at a comfortable, non-painful intensity.

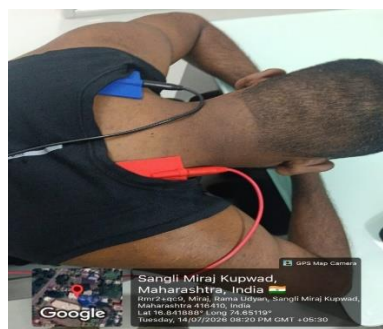


Figure 1: TENS Pain management

Eye-Cervical Re-education Program: The ECRP consisted of 10 exercises targeting ocular mobility, cervical mobility with restricted eye movement, head repositioning, and eye-neck coordination.

Exercise 1: Activation of ocular muscles without head movement, with eye movements in multiple directions, repeated with eyes open and closed.



Figure: Exercise 1

Exercise 2: Passive cervical rotation and flexion-extension while maintaining gaze on a fixed target, followed by repetition with eyes closed.



Figure 3: Exercise 2



Figure 4: Exercise 2B

Exercise 3: Active analytical cervical mobility while maintaining gaze on a target in different directions.



Figure 5: exercise 3

Exercise 4: Global cervical movement following a complex geometric path or graphic on a wall.



Figure 6: Exercise 4

Exercise 5: Cervical mobility with trunk movement while maintaining gaze on a target.

Exercise 6: First-degree head reposition exercise using a mirror and eyes closed; flexion-extension, rotation and lateral flexion were performed followed by repositioning to the starting position.

Exercise 7: Second-degree head reposition exercise with therapist-induced destabilization.

Exercise 8: Free eye-head coordination using a therapist-guided object for one minute, repeated twice.

Exercise 9: Manual-resistance coordination exercise for two minutes, with resistance adapted to the participant's condition.



Figure 7: Exercise 9

Exercise 10: Oculocervical coordination with multidirectional soft manual stimuli for two minutes.



Figure 8: Exercise 10

VI. OUTCOME MEASURES

Visual Analogue Scale (VAS): Pain intensity was assessed using a 10-cm visual analogue scale ranging from no pain to worst pain.

Joint Position Error (JPE) Test: The JPE test evaluates the ability to reposition the head accurately after cervical movement and is used as an indicator of cervical joint position sense. A larger repositioning error indicates poorer cervical proprioceptive accuracy.

VII. STATISTICAL ANALYSIS

Data were entered into an Excel spreadsheet and analysed using Python with the SciPy statistical package. Descriptive statistics were expressed as mean and standard deviation. Normality was examined using the Shapiro–Wilk test. Pre- and post-intervention values were compared using the paired-sample Wilcoxon signed-rank test. Effect size was calculated using a standardized correlation coefficient. A p value below 0.05 was considered statistically significant.

VIII. RESULTS

Thirty-three participants completed the study. The sample included 18 males (54.5%) and 15 females (45.5%). The recorded age range was 20–30 years, with a mean age of approximately 23.30 ± 2.58 years.

Gender	N	Percentage
Male	18	54.5
Female	15	45.5
Total	33	100.0

Outcome	Pre Mean $\pm$ SD	Post Mean $\pm$ SD	Mean change	p value
VAS	6.00 ± 0.75	3.73 ± 0.80	2.27	<0.001
JPE	6.32 ± 0.68	4.61 ± 0.69	1.69	<0.001

Pain: Mean VAS decreased from 6.00 ± 0.75 before intervention to 3.73 ± 0.80 after intervention. The Wilcoxon signed-rank test demonstrated a statistically significant difference ($W = 528$, $p < 0.001$), with a reported very large rank-biserial effect.

Cervical proprioception: Mean JPE decreased from approximately 6.32 ± 0.68 before intervention to 4.61 ± 0.69 after intervention. The Wilcoxon signed-rank test demonstrated a statistically significant difference ($W = 559$, $p < 0.001$), with a reported very large rank-biserial effect.

IX. DISCUSSION

The present study investigated the effect of an eye-cervical rehabilitation program on pain and cervical proprioception in patients with text neck syndrome. The findings demonstrated significant improvements in both VAS and JPE following the three-week intervention.^[1]

The reduction in VAS suggests clinically meaningful improvement in neck pain. The intervention combined therapeutic massage and TENS for pain relief with ECRP exercises aimed at improving sensorimotor control.^[3]

Increased activity of the superficial neck muscles may serve as a compensation for the altered activation of the deep cervical muscles, which, conversely, exhibit signs of inhibition in the presence of neck pain. Extended overactivity of the superficial cervical muscles could negatively affect the properties of the muscle fiber membrane. This may clarify the improvements in pressure pain sensitivity in the trapezius resulting from eye-neck coordination exercises.^[1] Cervical proprioception also improved, as demonstrated by the reduction in JPE. The findings are consistent with previous research reporting beneficial effects of eye-cervical re-education on cervical mobility and pain-related outcomes. The young age profile of the sample may indicate that the observed impairments were predominantly related to prolonged postural and device-use demands rather than age-related cervical degeneration.^[2] The ECRP component incorporated visual and cervical inputs through ocular movements, head repositioning and eye-head coordination, which may contribute to more accurate cervical position awareness.^[1]

However, because the present study used a pre-post design and combined ECRP with massage and TENS, the independent contribution of ECRP cannot be established. Controlled trials comparing ECRP with other physiotherapy interventions are required.

X. CONCLUSION

The present study concluded that the three-week intervention was associated with significant reductions in neck pain and improvement in cervical proprioception among young adults with text neck syndrome. Significant improvements were observed in VAS and JPE scores. The findings support the clinical applicability of an intervention incorporating eye-cervical re-education along with pain-management modalities; however, larger controlled studies with longer follow-up are required to confirm the independent and long-term effects of ECRP.

XI. LIMITATIONS

- Short intervention duration and absence of long-term follow-up.
- The sample was predominantly young adults, limiting generalizability to other age groups.
- The study was conducted in a single setting.
- Pain and proprioception outcomes may be influenced by participant response and measurement variability.
- Daily activity, ergonomic habits, physical activity, stress and screen time were not controlled.
- Because multiple interventions were provided, the specific effect of ECRP could not be isolated.

XII. FUTURE RECOMMENDATIONS

- Conduct randomized controlled trials with larger sample sizes.
- Include long-term follow-up to evaluate retention of treatment effects.
- Recruit participants from multiple centres and diverse age groups.
- Compare ECRP with established physiotherapy techniques and/or usual care.
- Investigate the independent effect of ECRP by using appropriate control groups.

XIII. REFERENCES

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