International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 05 , May - 2026

Effectiveness of Deep Cervical Flexor Muscle Training on Neck Pain and Functional Disability Among School Teachers: A Pre-Post Experimental Study

Asha Glory P J, Uca Student ,
Dr. Roxy A. R , Mpt Cardio , Associate Professor
UCA College Of Paramedical Sciences, Chennai, Tamil Nadu

Abstract

Background:
Neck pain is one of the most common musculoskeletal disorders among school teachers due to prolonged standing, poor posture, repetitive writing on boards, and improper ergonomics. Weakness of deep cervical flexor (DCF) muscles contributes to cervical instability and functional disability.

Objective:
To evaluate the effectiveness of deep cervical flexor muscle training using pressure biofeedback on neck pain and functional disability among school teachers.

Methods:
A pre–post experimental study was conducted among 10 school teachers aged 30–40 years with chronic mechanical neck pain. Participants received DCF muscle training along with conventional exercises for 6 weeks, 5 days per week. Outcome measures included Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI), and Craniocervical Flexion Test (CCFT). Statistical analysis was performed using paired t-test with significance level set at $p < 0.05$.

Results:
The study demonstrated statistically significant improvement in pain intensity, functional disability, and cervical flexor endurance after intervention. Mean NPRS scores reduced from 7.1 ± 0.87 to 2.8 ± 0.78 ($p < 0.001$). Mean NDI scores improved from 24.5 ± 3.2 to 11.4 ± 2.6 ($p < 0.001$). CCFT performance increased significantly from 18.3 ± 2.1 mmHg to 26.7 ± 2.4 mmHg ($p < 0.001$).

Conclusion:
Deep cervical flexor muscle training using pressure biofeedback is effective in reducing neck pain and improving functional disability among school teachers.

Keywords:
Deep cervical flexor muscles, neck pain, school teachers, pressure biofeedback, Neck Disability Index, cervical stabilization.

INTRODUCTION

Neck pain is a highly prevalent musculoskeletal disorder affecting working populations worldwide. Teaching professionals are particularly vulnerable due to prolonged static postures, repetitive neck movements, poor ergonomic conditions, and increased occupational stress. Chronic neck pain adversely affects functional performance, productivity, and quality of life among teachers.

The deep cervical flexor muscles play an essential role in maintaining cervical spine stability and posture. Dysfunction or weakness of these muscles leads to altered neuromuscular control, forward head posture, and persistent neck pain. Deep cervical flexor training using pressure biofeedback has emerged as an effective rehabilitation technique to restore muscular endurance and improve cervical function.

Previous studies have reported significant improvement in pain and disability following DCF training programs. However, limited evidence is available specifically among school teachers. Therefore, the present study aimed to determine the effectiveness of DCF muscle training on neck pain and functional disability in school teachers.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 05 , May - 2026

Need for the Study

School teachers frequently experience neck pain due to prolonged standing, blackboard writing, computer use, and poor postural habits. Persistent neck pain may lead to absenteeism, reduced work efficiency, and long-term disability. Early physiotherapy intervention focusing on cervical stabilization may help reduce symptoms and improve occupational health.

This study was undertaken to identify the effectiveness of DCF muscle training using pressure biofeedback in improving neck pain and functional disability among school teachers.

Aim of the Study

To evaluate the effectiveness of deep cervical flexor muscle training on neck pain and functional disability among school teachers.

Objectives

- To assess neck pain intensity using NPRS before and after intervention.
- To evaluate functional disability using Neck Disability Index (NDI).
- To assess deep cervical flexor endurance using Craniocervical Flexion Test (CCFT).
- To determine the effectiveness of DCF muscle training using pressure biofeedback.

Hypothesis

Null Hypothesis (H_0)

There will be no significant difference in neck pain and functional disability following deep cervical flexor muscle training.

Alternative Hypothesis (H_1)

There will be a significant improvement in neck pain and functional disability following deep cervical flexor muscle training.

Review of Literature

Several studies have demonstrated the association between occupational posture and neck pain among teachers.

- Fatemeh Ehsani reported high prevalence of neck pain among Iranian school teachers due to ergonomic risk factors.
- Jyoti Kataria identified neck and shoulder dysfunction as a major cause of morbidity among teachers in Delhi NCR.
- Gwendolen A. Jull established that patients with neck pain demonstrate altered neuromuscular control of deep cervical flexor muscles.
- Zaheen Ahmed Iqbal observed that DCF training using pressure biofeedback significantly improves pain and disability in school teachers with neck pain.

These findings support the importance of cervical stabilization exercises in the management of chronic neck pain.

Methodology

Study Design
Pre–post experimental study.

Study Setting
Clinical physiotherapy setting.

Sample Size
10 participants.

Sampling Method
Convenient sampling.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 05 , May - 2026

Study Duration
6 weeks.

Population
School teachers with chronic mechanical neck pain.

Inclusion Criteria

1 Age between 30–40 years.
2 Both genders.
3 Chronic neck pain with NPRS score >5.
4 Mild to moderate disability on NDI.
5 Poor performance on CCFT.

Exclusion Criteria

1 Neurological signs and symptoms.
2 History of spinal surgery.
3 Ongoing treatment for neck pain.
4 Recent cervical trauma.
5 Severe cervical pathology.

Outcome Measures

1 Numeric Pain Rating Scale (NPRS)
2 Neck Disability Index (NDI)
3 Craniocervical Flexion Test (CCFT)

Procedure

Pre-Test Assessment

Participants were initially assessed using:

- NPRS
- NDI
- CCFT

Intervention Program

Conventional Exercises

➢ Stretching exercises for:

- Sternocleidomastoid
- Upper trapezius
- Levator scapulae
- Suboccipital muscles
- Pectoral muscles

Protocol:

- 10 repetitions
- 10-second hold
- 2-minute rest between sets
- 5 days/week for 6 weeks

Deep Cervical Flexor Training

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 05 , May - 2026

Participants performed craniocervical flexion exercises using pressure biofeedback.

Procedure:

- Crook lying position
- Pressure biofeedback unit inflated to 20 mmHg
- Progressive head nodding exercises targeting 5 pressure levels
- 3 sets of 10 repetitions
- 2-minute rest between sets
- 5 days/week for 6 week

Post-Test Assessment
Outcome measures were reassessed after 6 weeks.

Statistical Analysis

Data were analyzed using paired t-test.

Level of significance:
- $p < 0.05$ = Significant
- $p < 0.001$ = Highly significant

Results

Table 1: Comparison of NPRS Scores

Outcome	Pre-test Mean ± SD	Post-test Mean ± SD	t-value	p-value
NPRS	7.1 ± 0.87	2.8 ± 0.78	11.42	<0.001

The reduction in pain intensity was statistically highly significant.

Table 2: Comparison of NDI Scores

Outcome	Pre-test Mean ± SD	Post-test Mean ± SD	t-value	p-value
NDI	24.5 ± 3.2	11.4 ± 2.6	10.87	<0.001

Functional disability improved significantly after intervention.

Table 3: Comparison of CCFT Scores

Outcome	Pre-test Mean ± SD	Post-test Mean ± SD	t-value	p-value
CCFT	18.3 ± 2.1 mmHg	26.7 ± 2.4 mmHg	9.95	<0.001

Deep cervical flexor endurance improved significantly.

DISCUSSION

The present study demonstrated significant improvement in neck pain, functional disability, and cervical muscle endurance following DCF muscle training.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 05 , May - 2026

The reduction in NPRS and NDI scores indicates that cervical stabilization exercises effectively reduce pain and improve daily functional activities. Pressure biofeedback training enhances neuromuscular control and selective activation of deep cervical flexor muscles.

The findings are consistent with previous studies conducted by Zaheen Ahmed Iqbal and Gwendolen A. Jull, who reported significant improvements in pain and cervical function following DCF training.

SCOPE OF THE STUDY

1. The study highlights the importance of ergonomic rehabilitation among school teachers.

2. DCF training can be incorporated into physiotherapy management for occupational neck pain.

3. The intervention is cost-effective and non-invasive.

4. Future studies can include larger sample sizes and long-term follow-up.

5. The protocol may be applied in corporate workers, IT professionals, and healthcare workers with neck pain.

LIMITATIONS

1. Small sample size.
2. Short duration of intervention.
3. Lack of control group.
4. Limited generalizabilit

CONCLUSION

The study concludes that deep cervical flexor muscle training using pressure biofeedback significantly reduces neck pain and improves functional disability among school teachers. The intervention also enhances cervical flexor endurance and postural control.

REFERENCES

[1] Gwendolen A. Jull et al. Clinical assessment of deep cervical flexor muscles.
[2] Zaheen Ahmed Iqbal et al. Effect of deep cervical flexor training on school teachers with neck pain.
[3] Fatemeh Ehsani et al. Prevalence of neck pain among school teachers.
[4] Rabia Ashfaq et al. Pressure biofeedback training in mechanical neck pain.
[5] Holger Cramer et al. Validation of Neck Disability Index.