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ORIGINAL ARTICLE

IMPACTS OF ENDURANCE TRAINING ON DEEP CERVICAL FLEXOR MUSCLES ON NECK PAIN USING PRESSURE BIOFEEDBACK

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ABSTRACT

Background of the study: Neck pain is a common epidemiological problem in nowadays. Neck pain is more predominant in middle age and a typical condition influencing 20% to 70% of all inclusive community. Most instances of the neck pain are brought about by mechanical factors, for example, injuries and strains of the neck muscles or tendons. The objective of the study is to investigate the impacts of endurance training on deep cervical flexor muscles on neck pain using pressure biofeedback. **Methodology:** A comparative study with 30 patients taken from the outpatient department of A.C.S Medical College and Hospital. Inclusion criteria were neck pain of VAS below 7, patients with forward head posture, cervical spondylosis, aged between 18 to 70, both genders with poor deep flexor endurance were selected for the study. Self-reported Performa was given to all the patients and then they will be divided into two groups. Group a patient will be receiving strengthening exercises and deep cervical flexor training with pressure biofeedback and group b will be receiving strengthening exercises only. Both group receiving treatment duration for four times in a week up to four weeks. After 4 weeks treatment patients were improved by numeric pain rating scale, neck handicap file scale. **Results:** Cervical movement has increased essentially after four weeks training in experimental group contrasted with that in control group. **Conclusion:** Deep cervical flexor preparing with pressure biofeedback gives better clinical improvement as far as pain, cervical flexion, expansion ROM, DCF perseverance and NDI score.

Keywords: Neck pain; Deep cervical flexor; Pressure biofeedback.

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INTRODUCTION

Neck pain is a critical medical condition for grown-ups as well as for youthful. The beginning and course of neck pain is impacted by different elements with physical, psychosocial and individual elements communicating in the improvement of these disorders. Neck pain is turning out to be progressively pervasive in the public eye. Gauges show that 67% of people will endure neck pain at same phase of their life [1, 2].

Neck pain was portrayed as anon explicit agony in the district of the cervical thoracic intersection that is bothered by neck developments. Pain and disability of the neck is generally dominating among 20 to 60 years old. Neck pain predominance increments with age and become most normal in ladies around the fifth ten years of life. However the specific reason for the aggravation is obscure, most instances of neck pain are because of mechanical factors like injuries and strain of the muscles or tendons of neck [3].

Neck pain with related inability, the 1-years commonness in everybody went from 2% to 11% and from 11% to 14% in laborers detailed restricting their exercises as a result of neck pain. A few literary works investigated neck pain without reference into the upper appendages that endured something like 1 day. The worldwide point pervasiveness in 2010 was assessed to be 4.9% (females: 5.8%; guys: 4.0%)[4].

Various physical constructions in the cervical locale can be wellspring of nociception, including zygapophyseal joints, vertebral end plates, muscles, tendons, brain structures, and the inter vertebral circle .However, proof is missing to help the theory that these patho-physical elements are an essential wellspring of mechanical neck pain across the age range in most of patients.

The Deep Cervical Flexor Muscle (DCF) are viewed as a significant stabilizer of the Head-on-neck pose .It has been hypothesized that when the muscle execution is hindrance, the harmony between the back neck stabilizers and the DCFs will be upset and appropriate arrangement and stance is lost, which is then liable to add to cervical disability. In this way Deep Cervical Flexor Muscle (DCF) preparing is prescribed to expand the perseverance of these postural muscles, to progress in neck pain [5].

The Cranio Cervical Flexor Test (CCFT) is a clinical test for the physical activities of the physical activity of the profound cervical flexor muscles, longus capitis, and colli. The perseverance of DCF was characterized as the most extreme time that subjects could keep a base pushing pressure more prominent than 50mmHg. Solid perseverance estimation followed a laid out convention utilizing a Pressure Biofeedback Unit [6].

In a 2012 moderate-quality systematic review of patient has revealed result estimates on 8 distinct instruments. Of these, the NDI was the most widely examined over an assortment of neck pain condition and has been converted into numerous dialects. The NDI was likewise widely surveyed for its psychometric properties. They tracked down the estimation properties of the NDI to be satisfactory, aside from dependability, and temporarily suggested its utilization[7].

This is an Experimental study with sample size of 30 patients. This study was conducted at A.C.S Medical College and Hospital,

Velappanchavadi, Chennai. The study duration was 4 weeks and sampling design was convenient sampling method. Inclusion criteria of the study were Neck pain of vas below 7, Patient with forward head posture, Patient with primary complaint of neck pain, subjects those aged 18 to 70, both genders and subjects having poor deep flexor endurance.

Patients with history of trauma to neck, bilateral upper limb symptoms, cervical radiculopathy, myogenic neck pain, positive 2 or more neurological signs, History of cervical surgery, non chronic neck pain, headaches occurring during the last six months were excluded from the study. Outcome measures for the study were Neck Disability Scale and Numeric Pain Rating Scale. Materials used in the study were towels and pressure biofeedback.

Procedure: The patients who full fill the inclusion criteria will be included in the study. Self-reported Performa will be given to all the patients and then they will be divided into two groups.Group A patient will be receiving strengthening exercises and deep cervical flexor training with pressure biofeedback and group B will be receiving strengthening exercises only.Both group receiving treatment duration for three times in a week up to four weeks.After the four weeks subjects will be assessed by NPRS,NDI scale.

Numerical Pain Rating Scale: The NPRS is a Segmental numeric form of the visual analogue scale (VAS) in which a respondent chooses an entire number (0-10 whole numbers) that best mirrors the force of his\her pain. The normal organization is a level bar or line[22].

Cervical range of motion (CROM): Cervical ROM (dynamic) in flexion and expansion was estimated for each subject. Before estimation, the subject eliminated eye glasses, jewelry, T-shirt or tank top; and noticed a short exhibition of the cervical movement to be performed. To limit fluctuation in estimation brought about by contrasts in the subject body head position, and to be lay out an unbiased head and neck position, toward the beginning of each position measurement.

Flexion and extension:

Test Position: The subject in sitting position, with thoracic and lumbar spine supported by the back of a chair. The cervical spine is positioned in zero degrees of the rotation and later flexion.

Test Procedure: Neck movement degrees were measured on cervical flexion and extension. Specific instruction was given to the subjects for performance of neck flexion followed by chin tuck , then move head forward and downward as far as possible until limited by tightness or discomfort. Normal range of cervical flexion averages to around zero 0-50 degrees.

Specific instructions for neck extension was raise chin first, followed by move head backward, looking up as far as possible until limited by tightness or discomfort. Normal range of cervical extension averages to around 0-60 degree[23].

Cranio-cervical Flexion Test (CCFT): The cranio cervical flexion test is performed with the patient in supine lying with the neck in an impartial position (no cushion) to such an extent that the line of the face is level and the line bisecting the neck longitudinally is flat to the testing surface. The uninflated pressure sensor is set in the curve of neck with the goal that it adjoins the occiput and is swelled to a

steady benchmark tension of twenty mm Hg; this addresses a guidelines pressure sufficiently adequate to occupy the space between the testing surface and the neck yet doesn't expand the lordosis. The input and course is given by the gadget to play out the necessary five phases of the test. The patient is told that the test is for precision rather than strength. The head gesturing activity is preformed delicately and gradually. The ever-evolving inward reach enactment and perseverance of the profound cervical flexors are tried by Cranio Cervical flexion tests. Pressure increments during the technique as the patient endeavors a progressive 3 endeavor of 2 mm Hg movement (20 mmHg to 30 mmHg). Likewise keep an isometric withdrawal during moderate tensions as a perseverance task.

Deep cervical flexor training: It targets deep flexors of the upper cervical district, the longus capitis, and colli, rather than the shallow flexors, sterno-cleidomastoid, and foremost scalene muscles, which flex the neck however not the head. The patient was told to perform and hold logically the inward scopes of Cranio Cervical Flexion while attempting to keep the shallow flexors loose. Patients were first instructed to play out a sluggish and controlled Cranio Cervical Flexion development. They were than prepared to have the option to statically hold dynamically expanding inward scope of Cranio Cervical Flexion.

Subjects were directed to the expansion the inward reach positions through criticism acquired structure the dial of an air-filled pressure sensor put behind the neck, which screens the slight leveling of the lordosis. This smoothing has been displayed to go with constriction of longus colli.

Fig 1: Deep cervical flexor training

Strengthening exercises: To begin, sit in a seat with your feet level on the floor. Your weight ought to be somewhat forward so that you're adjusted equally on your bottom. Loosen up your shoulders and keep your head level. Utilizing a seat with arms might assist you with keeping your equilibrium.

1. Press your palm against your temple. Resist with your neck muscles. Hold for 10seconds.Relax, Repeat multiple times.

2. Rehash the activity, pushing on your head. Rehash multiple times, Switch sides.

3. Rehash the activity, pushing on the rear of your head. Rehash multiple times.

For your wellbeing, check with your medical services supplier prior to beginning an activity program. Both group receiving conventional exercises for 15 minutes and experimental group receiving deep cervical flexor training for 10 minutes. Both group receiving conventional exercises three times week for four weeks .The experimental group receiving deep cervical flexor training thrice a week.

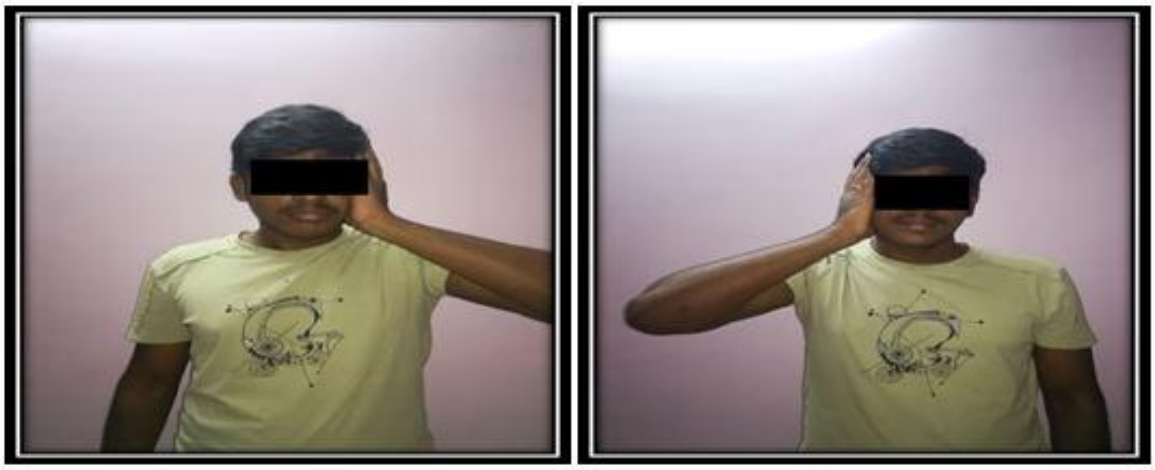


Figure 2(A, B): Neck lateral Flexion to right and left side

Figure 3 (A, B): Resisted Neck Flexion and extension

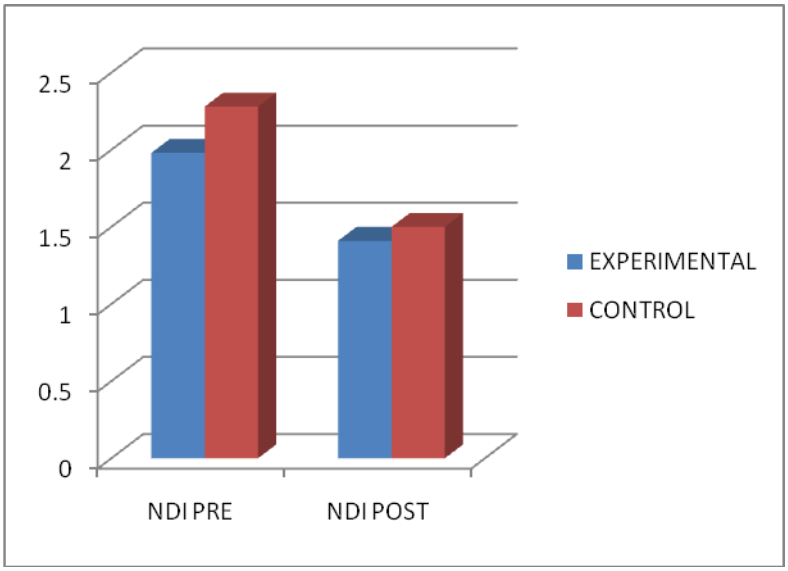
Neck disability index: This questionnaire has been intended to give us data regarding what your neck pain has meant for your capacity to oversee in daily existence. Every one of the 10 things is scored from 0-5. The most extreme score is along these lines 50. They got score can be duplicated by 2 to deliver a rate score. Incidentally, a respondent won't finish some inquiry. The normal of any remaining things is then added to the finished items [24].

Data analysis: The graphic insights, rate investigation were utilized for classified factors and mean and S.D was utilized persistent factors. The investigation of slanted information between the gatherings was finished by Mann Whitney U test. Matched t test was utilized to examine the factors the inside the gathering, aside from pain. While, Wilcoxon marked

positions test was utilized to break down inside the gathering NPRS score. The factual tests were viewed as critical when the p esteem is under 0.05.

S.NO	GROUP	VAS(S.D±MEAN)		T-VALUE	P-VALUE
		PRE	POST		
1	EXPERIMENTAL	0.81(7.15)	0.7(1.85)	22.98	0.000
2	CONTROL	0.82(7.05)	0.75(1.9)	17.07	0.000

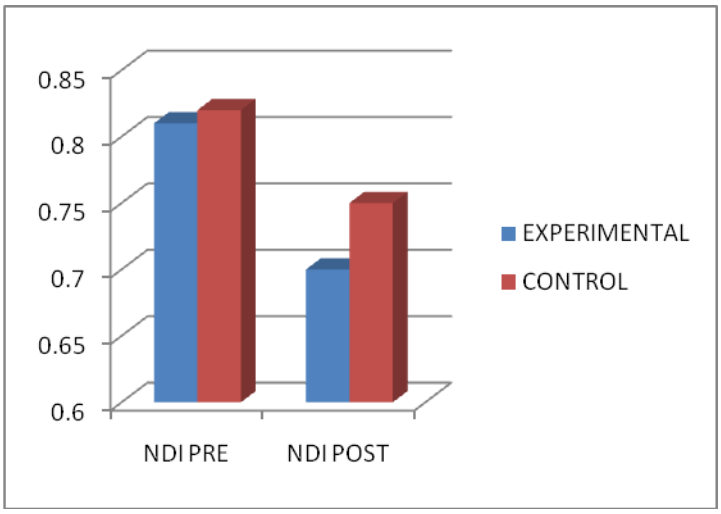
Table-1 Analysis of VAS with In the Groups, Analysis of paired t-test < 0.001 significant



Graph 1: Analysis of NDI & VAS within the Groups

S.NO	GROUP	NDI(S.D±MEAN)		T-VALUE	P-VALUE
		PRE	POST		
1	EXPERIMENTAL	1.98(23.50)	1.41(7.10)	27.53	0.000
2	CONTROL	2.28(24.20)	1.5(8.1)	23.15	0.000

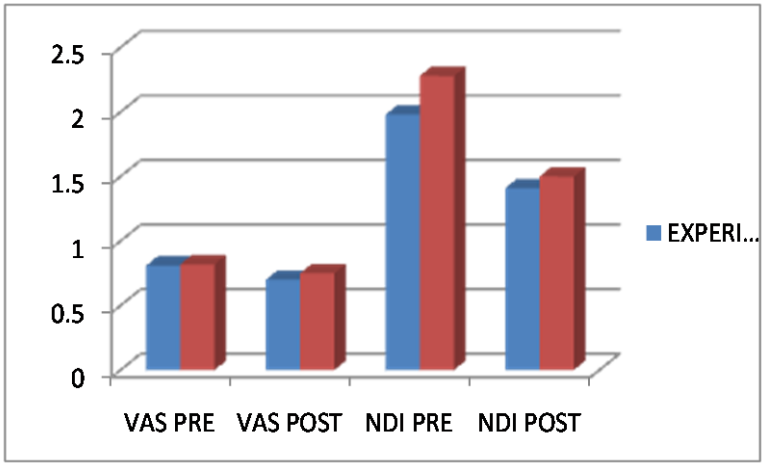
Table-2. Analysis of NDI within the groups, Analysis of paired t-test < 0.001 significant



Graph 2: Analysis of NDI & Vas between Groups

S.NO	GROUP	VAS(S.D± MEAN)		NDI(S.D± MEAN)		P-VALUE	T-VALUE
		PRE	POST	PRE	POST		
1	EXPERIMENTAL	0.81(7.15)	0.7(1.85)	1.98(23.50)	1.41(7.10)	22.98	0.000
2	CONTROL	0.82(7.05)	0.75(1.9)	2.28(24.20)	1.5(8.1)	27.95	0.000

TABLE-3 Analysis of VAS within the groups, Analysis of paired t-test < 0.001 significant



Graph: 3 Analysis of Paired T-Test < 0.001 Significant

RESULTS

The trial group showed a fundamentally more noteworthy expansion in cervical ROM between post-preparing and the multi week detraining period, contrasted with control group. Solid perseverance of DCF, showed an essentially more noteworthy increment between pre-preparing and post-preparing in the exploratory gathering, contrasted with control group.

DISCUSSION

Neck pain is a constant issue and adds to monetary weight to the general public. Contributing mechanical reason for repetitive neck pain can be aggravation in engine control of the cervical spine which might build the gamble of miniature/full scale injury of cervical structure[25].

Limitation of muscle work is hence viewed as crucial for the treatment of cervical spine problem. Diminished actuation of the profound cervical flexors muscle has been noticed straightforwardly and by implication when individuals with neck pain play out the cranio cervical flexion test. Up until this point, there are no investigations contrasting the profound cervical flexor preparing and without biofeedback[6].

A comparative report has been led on pressure biofeedback directed profound cervical flexor preparing alongside traditional treatment and regular treatment just in neck pain. Practice including extending of sternocledіod muscle, upper trapezius, levator scapulae, trapezius for 10 redundancies. The review inferred that cervical flexor with biofeedback was successful than the benchmark group. The entomb group examination showed genuinely huge contrast in muscle execution (p=<.001) and pain forces (p=<.004) [17]. An investigation of results inside the gatherings was finished utilizing t-test, Wilcoxon marked rank test and the perception of present review were as per the following:

The post aerobic exercise information of DCF perseverance for groupes 1, 2 and 3 were 17%, 4.8%, and 3.6% improvement when contrasted earlier with preparing once more gathering a had a critical extent of progress[15].

The post mediation information of NPRS for group 1 uncovers. A comparatively of 58% decrease of manifestation (pain) in group 2 and 55% decrease of side effect (pain) in group 3 were found. The post mediation results of NPRS uncover that group 1 had more prominent extent of progress, when contrasted with other two groups [26].

Concerning a cervical ROM finished up, the post mediation information of gathering 1 had critical 14.6% improvement for group 2 and 3 separately. The result for ROM uncovers a more prominent extent of progress among group 1 patients. The NDI for group 1, post entomb information uncovers a critical 81% decrease of incapacity, when contrasted with preintervention. The NDI for group 2, post mediation information uncovers a critical 57.5% decrease of incapacity, when contrasted with pre intercession. The NDI for group 3, post mediation information uncovers a critical 32.7% decrease of incapacity, when contrasted with pre intercession[27].

The investigation of previously mentioned results perhaps induced that the examination of result factors had an improvement for every one of the three review gatherings include Albeit, a general contrast existed between the gatherings. An examination of results between

the gatherings was finished utilizing mann-whitney u test.

The post mediation investigation between group 1&2, group 1&3 and gatherings 2&3, shows that there is huge decrease in the pain force of gatherings 1&2 (p=<.004), contrasted with group 2&3 (p=<.944) and group 1&2 (p=<.010) separately. This expresses that the aggravation force between the tension biofeedback directed DCF preparing and just regular treatment was critical (p=.004).

The post mediation investigation between the groups1&3, group 2&3, shows that, there is critical improvement in the cervical flexion (p=<.000) and augmentation (p=.000) in group 1&3, contrasted with group 2&3(p=<.057) (p=<.0.12) and group 1&2 (p=<.005) (p=<.095).

There was critical improvement in DCF perseverance in group1&3(p=<.000) than group 1&2 and groups2&3. The muscle execution of was genuinely huge improvement in pressure biofeedback group than the benchmark group.

The post intercession investigation between the groups1&2, group 1&3 groups2&3, show that, there is critical decrease in the NDI score of gatherings 1&2(p=<.000), and 1&3(p=<.000) and group 2&3 (p=<.018) individually.

Between group investigation of gathering 1 with that of gathering 2 and gathering 3 shows every one of the results factors, for example, pain power, cervical flexion and augmentation ROM, DCF perseverance and neck incapacity file score of gathering 1 displayed to have a serious level of importance than group 2 and 3.

These importance can be contributed the reality basmajian, (1963) expressed that the subject could handle the enrollment as well as the recurrence of release of engine units through hear-able and visual criticism. Adjunctive treatment of tension biofeedback was a compelling method for decreasing pain [17].

Clinical ramifications: The perceptions of present review uncover that, patients having a place with group 1 had a huge clinical and measurable improvement. Henceforth, it could be deduced that for patients with neck pain, the treatment routine ought to incorporate profound cervical flexor preparing with pressure biofeedback. This might achieve a superior clinical result and consequently useful status of neck.

Ethical clearance: There was no risk of conducting this study. Ethical clearance was obtained from the ethical Institutional Review Board of Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai with reference No. A26/PHYSIO/IRB/2018-2019 approval letter dated 08/01/2019.

Conflicts of Interest: There is no conflict of interest to conduct this study.

Fund for the study: This is self-funded study.

CONCLUSION

Deep cervical flexor preparing with pressure biofeedback gives better clinical improvement as far as pain, cervical flexion, expansion ROM, DCF perseverance and NDI score.

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