

# Effectiveness of Neck muscle Endurance exercise along with Conventional Physiotherapy for chronic mechanical Neck pain

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## Abstract

**Objectives of the study:** To compare the effectiveness of neck muscle endurance exercise along with conventional physiotherapy and only conventional physiotherapy for chronic mechanical neck pain patients. **Methodology:** It is a quasi experimental different subject design. A randomized controlled trial comparing conventional physiotherapy and neck muscle endurance exercise with conventional physiotherapy alone. Eighteen participants (18) with chronic mechanical neck pain were allocated at random assigned into the conventional physiotherapy with neck muscle endurance exercise or conventional physiotherapy alone group. **Main outcome measures:** Every participant was assessed before and after 4 session treatment by VAS in neck and different functional positions, they are: in general, sitting, traveling, neck turning and sleeping. Reduction of pain intensity measured by differences between pre test and post test pain scores of each patient in both groups. **Results:** Conventional physiotherapy with neck muscle endurance exercise group showed significant pain reduction in four variables among the five variables. The results are – in general ( $p < 0.05$ ), sitting ( $p < 0.01$ ), traveling ( $p < 0.05$ ), neck turning ( $p < 0.025$ ). Significant pain reduction was not found in sleeping position ( $p < 0.10$ ). **Conclusion:** The results of this study have identified the effectiveness of conventional physiotherapy with neck muscle endurance exercise was better than the conventional physiotherapy alone for chronic mechanical neck pain patients at different functional position. It may be helpful for patient with chronic mechanical neck pain patients to return daily normal activities and work.

**Key words:** Conventional physiotherapy, Endurance exercise, Mechanical, Neck pain.

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## Introduction

The mechanical neck pain is the most common problem (Bland 1987). Neck pain is survived by the most people at some point in their life (Pillinger & Rutherford 2005). For the neck pain common treatment consists of drugs, massage and other manual treatments, physiotherapy and exercise, local and epidural injections, and patient education. Also we find that Systematic reviews have shown that the efficacy of these interventions remains questionable (Irnich et al 2001). In a survey about attitudes on treatment of musculoskeletal disease, active exercise, traction. TENS and ultrasound were perceived to be the best methods for the treatment of neck pain (Aker et al. 1996). Pain located in the neck is a common medical condition (Shiel 2005). It can come from a number of disorders and diseases of any structure in the neck. Neck pain is also referred to as cervical pain. In a More than half of people develop about of neck pain at some time in their life. A survey done in the UK found that show that adults aged 45-75 years, about 1 in 4 women and about 1 in 5 men had current neck pain (Neck pain in adults 2006). At any specific time, 12% of the adult female population and 9% of the adult male population experience pain in the neck, with or without associated arm pain and 35% of people can recall an episode of neck pain (Bland 1994, p.3). Chronic neck pain patients are often referred to a Physiotherapist and, although many treatments are available, it remains unclear which type of treatment is to be preferred. (Vonk et al 2004) We have found that in Netherlands In 1996 total related costs were estimated to be US \$686.2

million, which is about 1% of the total Dutch health care expenditures (Vonk et al 2004).

According to Ylinen (2003) most patients who present with neck pain have "non-specific (simple) neck pain," where symptoms have a postural or mechanical basis. Etiological factors are poorly understood and are usually multifactorial, including poor posture, anxiety, depression, neck strain, and sporting or occupational activities. Neck pain after whiplash injury also fits into this category, provided no bony injury or neurological deficit is present. When mechanical factors are prominent, the condition is often referred to as "cervical Spondylosis," Randomized controlled trials identified by systematic reviews provide moderate evidence that various exercise regimens—using proprioceptive, strengthening, endurance, or coordination exercises—are more effective than usual care (analgesics, non-steroidal anti-inflammatory drugs, or muscle relaxants.

*Conventional physiotherapy for neck pain:* There is no clear definition of conventional physiotherapy. But Oxford Advanced Learner dictionary (1995, p. 254) states that conventional means tending to follow what is done or considered acceptable or following what is traditional or the way that has been that has been done for a long time. Therefore conventional physiotherapy refers to what is done or following traditional physiotherapy treatment that has been done for a long time in the department of physiotherapy. Traditionally, in conventional treatment rest is prescribed for back pain. A physiotherapist may use mobilization techniques backed by ultrasound, laser, or heat treatment. Treatment can



include traction, a collar or corset, TENS (Back pain: Conventional treatment 2005). For most neck pain patient, usual physiotherapy is the superior treatment (Moffett 2004a).

Usual physiotherapy treatments are groups of specific treatments. Groups are electrotherapy, manual therapy or mobilization and advice (Moffett 2004b) So we can say that conventional physiotherapy is a combination of different treatment approach which is used in the physiotherapy department.

List of conventional physiotherapy treatment used in CRP outdoor musculoskeletal physiotherapy department for chronic mechanical neck pain with a written protocol from head of physiotherapy department:

- Mechanical directional movements:
- Mobilization
- Accessory movement
- Strengthening
- Traction
- Mulligan approach
- Infra red radiation
- Transcutaneous electrical nerve stimulation (TENS)
- Postural reeducation
- Home advice

*Endurance exercise:* It is the ability of a muscle or group of muscle to sustain physical activity without under fatigue (Sunder, S 2002, p. 56). It is active and dynamic exercise. Endurance exercise or endurance training consists of performing low- to medium-intensity exercise for long periods of time. (Wikipedia 2008) It is that training which augments energy capacity of the muscle by means of an exercise program (Sunder, S 2002, p. 56). Perform the following four movements as a minicircuit, progressing as follows: front, left side, right side, reverse. Take a one- to two-minute break, and then repeat. Perform 12 to 15 reps in each direction.

### Methodology

This research was a quantitative evaluation of the of the neck muscle endurance exercise along with conventional physiotherapy for chronic mechanical neck pain. To identify the effectiveness of this treatment approach Visual Analogue Scale (VAS) was used as measurement tools for measuring the pain intensity in several functioning position. The study was done using a quantitative quasi experimental different subject design. A quasi-experimental design differs from a true experimental design in that, although it contains an independent variable that is manipulated in order to look for an effect on a dependent variable, either control or randomization is lacking (Bailey 1997, p.47). In this study, randomization in terms of selection was lacking and the convenient sampling procedure was used. But the samples were randomly assigned to control and experimental groups. When two or more different groups of subjects are used and compared in a project, it is called

an unrelated, between or different subject design (Hicks 2000, p.75). So the study is a quasi-experimental between different subject design. Endurance and conventional Physiotherapy was applied to the experimental group and conventional Physiotherapy was applied to the control group. After manipulation of independent variables, the outcomes were compared.

*Setting:* The study was conducted in two settings. One setting is musculoskeletal department Savar and Mirpur. This two setting were specialized for musculoskeletal physiotherapy and they use same types of assessment form and treatment protocol. That was the reason for choosing this two setting.

*Study population and sample:* 18 patients with chronic mechanical neck pain were collected using convenience sampling from the outdoor physiotherapy department of Centre for the Rehabilitation of the Paralyzed (Savar & Mirpur). When the sample was collected they were given a numerical number such as 1, 2, 3, 4, etc. after worth researcher randomly selected the odd number samples and even number samples for the control and experimental group. Total 18 samples included in this study among them 9 patient for the experimental group (Received neck muscle endurance exercise and conventional physiotherapy) and rest 9 was gone to the control group (Only conventional physiotherapy). 'Random assignment improves internal validity of experimental research' (Hicks 1997, p.46).

### Inclusion criteria:

- Mechanical cause of chronic neck pain
- Age group (12-55): Patients with the cervical derangement syndrome are usually aged between twelve and fifty five years (Mackenzie 1992, p. 204)
- Weakness of neck muscles
- Included were those who were not receiving drug or other therapy for their neck problems.
- Willingness: if the researcher needs to be more significant so that subject's willingness was helpful for co-coordinating and focusing the result and there was shown no bias.
- Both sex are same priority

### Exclusion criteria:

- Neurological problem: This type of patients are very much complicated to manage and sometimes result may vary after taking therapy because of their associated problem (Islam 2005, p.25).
- Acute traumatic neck pain.
- Vertebral artery insufficiency: the main symptoms and sign positive vertebral artery test can be recommended by using 5DS that Dizziness, Diplopia, Drop attack, Dysarthria and Dysphagia. (Islam 2005, p.25)
- Malignancy involving the vertebral column.



- Cauda equina lesions producing disturbance of bladder and or Bowel function.
- Rheumatoid collagen necrosis of vertebral ligaments. Cervical spine is especially vulnerable.
- Active inflammatory and infective arthritis.
- Bone disease of the spine. (If no more than a simple osteoporosis of ageing).

*Measurement tool:* Visual analogue scale (VAS) – for measuring pain intensity in several function positions. Visual analogue scale is one of the most frequently used measurement scales in health care research. The VAS is most commonly known and used for measurement of pain’ (Johnson 2002).

*Process of data collection:* The study procedure was consisted of assessing the patient, initial recording, treatment and final recording. After the screening of the patient at department, the suspected patent was assessed by the departmental Physiotherapist and diagnosis, inclusion criteria and exclusion criteria were confirmed. An initial recording of pain level at VAS scale was taken before the treatment and treatment was continued. Four sessions of treatment were provided to every subject. Final recording of the pain level were immediately recorded after completion of four sessions of treatments.

*Duration of data collection:* Within 6 weeks the researcher conducted research with the participant and collected data carefully.

*Data analysis:* The data was analyzed by unrelated *t*-test. According to Hicks (1998, p.92), experimental studies with the different subject design where two groups are used and each tested in two different conditions and the data is interval or ratio should be analyzed with unrelated ‘*t*’ test.

*Informed Consent:* The researcher obtained consent to participate from every subject. A signed informed consent form was received from each subject. All subjects stopped taking medicine willingly. If the participant got worse or thought that treatment was not enough to control his/her condition then they were meet

with the outdoor doctor. Subjects were informed that they were completely free to decline answering any questions during the study and were free to withdraw their consent and terminate participation at any time.

*Significant level:* To find out the significant level of the P (Probability ) value. This experimental study hypothesis was one tailed because it was producing a specific direction of the result. If P value is < .05 which will be accepted by the researcher to show the significant result of the study to prove or support the hypothesis and reject the null hypothesis. ‘The statistical approach to determining sample size is the power calculation. Statistical power is a measure of how likely the result is to produce a statistically significant result for a difference between groups of a given magnitude’ (Bowling 1997, p.149).

Statistical test of significant apply probability theory to work out the changes of obtaining the observer result the significance levels of 0.05, 0.01, 0.001 are commonly used an indicated of statistically significant difference between variables (Bowling 1997, p. 170).

### Results

Mean difference of reduction of pain intensity between pre-test and post-test in conventional physiotherapy with neck muscle endurance exercise and only conventional physiotherapy group.

Name of the variables	Conventional physiotherapy with neck muscle endurance exercise group	Only conventional physiotherapy group
General pain intensity	2.54	1.86
Pain on sitting	2.5	1.67
Pain at traveling	2.56	1.78
Pain at neck turning	2.8	1.72
Pain at sleeping	2.28	1.67

**Figure 1:** Mean difference of reduction of pain intensity between pre-test and post-test in experimental and control group.

Variables in the study statistically significance at the following level of significance:

Variables	Observed ‘t’ value	Observed P value	Significant	Not Significant
General pain intensity	1.882	0.05	Significant	.....
Pain on sitting	2.597	0.01	Significant	.....
Pain at traveling	1.969	0.05	Significant	.....
Pain at neck turning	2.481	0.05	Significant	.....
Pain at sleeping	1.45	0.10	.....	Not Significant

### Discussion

In this experimental study 18 patients with chronic mechanical neck pain were conveniently allocated to the conventional physiotherapy with neck muscle endurance

exercise group or the only conventional physiotherapy group among them 9 patients to the conventional physiotherapy with neck muscle endurance exercise group and 9 patients to the only conventional



physiotherapy group. The first group received conventional physiotherapy with neck muscle endurance exercise and the second group received only conventional physiotherapy. Each group attended for 4 sessions (each session for 30 minutes) of treatment within 4 weeks in the physiotherapy outdoor department of CRP Savar and Mirpur. And the outcome measured of pain intensity using VAS. The study assessed patient's pain in 5 different functioning. They were: pain general intensity, pain affected on sitting (30 minutes above), pain affected on traveling, pain affected on neck turning and pain affected on sleeping. An endurance-strength exercise regime for the cervical flexor muscles is effective in reducing myoelectric manifestations of superficial cervical flexor muscle fatigue as well as increasing cervical flexion strength in a group of patients with chronic non-severe neck pain. (Falla, D. 2006)

In general, significant ( $p < .05$ ) pain reduction was found between the two groups. The mean reduction of pain intensity in the experimental or conventional with endurance exercise group was 2.54 and conventional physiotherapy alone group was 1.86 which means that pain reduction in conventional with endurance exercise group was greater than the conventional physiotherapy alone group. And the result is statistically significant. Falla Deborah (2007) did a research on "Effect of neck exercise on sitting posture in patients with chronic neck pain". Across the duration of the task when compared with the endurance-strength training group. In addition, both groups improved their ability to maintain an upright posture of the thoracic spine; however, there was no significant difference between the 2 intervention groups ( $F = 2.55$ ;  $df = 1, 1, 1$ ;  $P > 0.01$ )

After prolong sitting, significant ( $p < .01$ ) pain reduction was found between the two groups. The mean reduction of pain intensity in the experimental or conventional with endurance exercise group was 2.56 and conventional physiotherapy alone group was 1.67 which means that pain reduction in conventional with endurance exercise group was greater than the conventional physiotherapy alone group. And the result is statistically significant. Ylinen J et al. (2003) did a research on "controlled endurance or strength training of the neck muscles decreases pain and disability in women with chronic neck pain. Investigators randomize 180 patients with chronic neck pain in three groups. At the 12 months follow up, neck pain was reduced by 61% and 69% in the endurance and strength training groups respectively, compared with 27% in the control group ( $P < 0.001$ ).

McKenzie (1995, p.115) suggested that to be a passenger is better than to drive or long journey. This means that travelling is an aggravating factor for back pain. After traveling, significant ( $P < 0.05$ ) pain was found between the two groups. The mean reduction of pain intensity in the experimental or conventional with endurance exercise group was 2.56 and conventional physiotherapy alone group was 1.78 which means that pain reduction in

conventional with endurance exercise group was greater than the conventional physiotherapy alone group. And the result is statistically significant. At 12-month follow-up, neck pain and disability were significantly less in both training groups compared with the control group ( $P < .001$ ). In the strength training group, improvements in maximal isometric neck strength were 110% in flexion, 76% in rotation, and 69% in extension. In the endurance training group, the respective improvements were 28%, 29%, and 16% compared with 10%, 10%, and 7% in the control group. (Strength/Endurance Training Effective in Chronic Neck Pain 2003)

The 't' value of pain intensity in neck turning is 2.481. The mean scores of reduction of pain intensity on neck turning for the treatment group is greater than control group (2.8 as opposed to 1.72). And using the unrelated 't' test the 't' value is 2.481 so the probability level of less than 0.025. And the result was found to be significant.

In lying position, significant ( $P < 0.10$ ) pain reduction was not found between the two groups. The mean reduction of pain intensity in conventional physiotherapy with endurance exercise group was 2.28 and conventional physiotherapy alone was 1.67 which means that pain reduction in conventional physiotherapy with endurance exercise group was greater than the conventional physiotherapy alone group but this result was not statistically significant.

The study represent that the conventional physiotherapy with neck muscle endurance exercise or experimental group patients have improve more than the only conventional physiotherapy or control group patients.

### **Recommendation**

As a consequence of the research it is recommended that with further well-controlled double blinding study include comparison of the conventional physiotherapy with neck muscle endurance exercise group with the conventional physiotherapy alone and assessing effects and efficacy of these treatments. The data were analyzed by unrelated 't' test. If the sample size have to be increased then the data could be analyzed by unrelated 't' test distribution and also have to confirm the analysis by f test. The researcher did random assigned in both group rather than random selection. That's why researcher recommended to do further study with enough time and by maintaining random selection to make the study more valid.

### **Conclusion**

The result of the study have identified the effectiveness of conventional physiotherapy with neck muscle endurance exercise was better than the conventional physiotherapy alone for chronic mechanical neck pain patient at different functional; position which was a Quantitative experimental study. The result of the current study indicates that the conventional physiotherapy with



neck muscle endurance exercise can be an effective therapeutic approach for patient with chronic mechanical neck pain. Participants in the conventional physiotherapy with neck muscle endurance exercise group showed a greater benefit than those in the only conventional physiotherapy group. The result indicate that the significant changes in both groups are due to the selection of a well- defined population of chronic mechanical neck pain patients using specific inclusion and exclusion criteria. It may be helpful for patient with chronic mechanical neck pain to increase return to normal daily activities, work and to measure longer term effects to determine cost effectiveness of endurance exercise in conjunction with conventional physiotherapy as an intervention for chronic mechanical neck pain.

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