*Original Article*

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# Effect of Deep Neck Flexor Activation and Ergonomics Education on Work related Neck Pain in Bank Workers in Loni

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**Abstract**

*Background:* Bank workers are subjected to work on computers, deal with customers for on average 8 hours a day with minimum rest period. Most of the time work is performed in awkward postures. Neck pain was found to be most prevalent problem amongst bank workers. Reasons contributing to causes of neck pain can be attributed to awkward posture, sedentary work, maintaining static activity for typing data, handling mouse etc. Decreased activity of deep cervical flexors and increased activity of superficial cervical flexors was found to be the pathophysiology for the neck pain.

*Methodology:* This experimental study consists of 55 subjects with the age 19 to 50 years were selected as per inclusion and exclusion criteria. Group 'A' received deep cervical flexor activation along with ergonomic education. Group 'B' received ergonomic education only. In group A stretching to neck muscles, deep cervical flexor training using pressure biofeedback and ergonomic education was given. Group B received ergonomic education. Participants received intervention for 3 weeks, 5 days in a week. Outcome measure was NPRS, NDI and Cervical ROM measured before and after intervention. RULA was used to evaluate ergonomic posture.

*Results:* The participants in group A showed highly significant improvement in NPRS (2.72±1.24 to 0.909 ± 1.151), NDI (9.59±3.305 to 3.00±2.600) and cervical flexion (43.63±2.969 to 46.54±2.738), cervical extension (54.83±2.55 to 57.045±2.171), this was observed in comparison with group B.

*Conclusion:* Deep neck flexor activation is suitable to treat neck pain in bank workers reducing pain, disability and improving range of motion.

**Keywords:** Bank Workers; WMSDs; NDI; CCFT; Deep Cervical Flexion Activation; Ergonomic Education.

## Introduction

Musculoskeletal conditions are prevalent and their impact is pervasive. They are the most common cause of severe long-term pain and physical disability affecting the psychosocial status of affected people as well as their families and carers [1]. Along with back pain, neck pain is one of the most common musculoskeletal complaints related to work [2]. The prevalence increases with longer prevalence periods and generally women (18%) have more neck pain than men (11%) [3,4]. Causes of non specific neck pain are multifactorial [5]. A systemic review done on epidemiology of neck pain showed estimated that higher incidence of neck pain was seen in office and computer workers. The overall prevalence of neck pain in the general population ranges between 0.4% to 86.8% (mean: 23.1%) [6]. Work related Musculoskeletal disorders (WMSDs) rank first affecting the quality of life among other health problems [7].

A study done amongst Kuwaiti bank workers reported that the most affected body parts were the neck (53.5%), lower back (51.1%) shoulders (49.2%) and upper back (38.4%) suggesting the neck pain was most prevalent among bank workers [8].

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In the banking sector, banker' works involve the use of computer for data collection, processing and programming; hence the risk of developing musculoskeletal disorders inherent in computing industries [9]. Bank Managers are responsible for planning and defining targets for local branches; monitoring achievements; making decisions and attending special clients. These tasks are carried out using personal computers and telephone, in daily 8 to 10 hour shifts. The managers' work involved sitting job for most of the time. Cashiers' tasks include dealing with deposits and withdrawals, receiving a wide range of payments and selling branch products for clients. These tasks are performed with the worker sitting through their 8 hour shifts involving intensive use of personal computers for typing data and the stamping of many documents (using heavy wooden stamps). The tasks performed by the clerks vary according to the branches' sectors to which they were allocated. They are included in liaising with personal and business clients in person and by telephone, a range of administrative activities such as preparing and monitoring contracts for loans and concessions, and checking and typing information. Their job involves nearly continuous use of personal computers and telephones often simultaneously, although their daily routine varies according to the clients' demands. Compared to the cashiers their computer use is less extensive [10].

The intensive computer work requires repetitive movements of the upper limbs, such as typing with the keyboard and handling the mouse, but also static muscle activity while keeping the arms and neck in a stable position. The computer work also overloads the neck, shoulder, and upper limb muscles and joints to maintain it into static position [11]. Evidence has shown impaired cervical flexor muscle motor control and strength in individuals with neck pain disorders. Recent research, investigating deep and superficial cervical muscle coordination, has shown that in a low load Cranio cervical flexion (CCF) task the Deep Cervical flexors (DCFs) such as longuscapitis and longuscolli are specifically targeted [12]. Ergonomics has broad application that can be used at every workplace. If specific problems are found during worksite evaluation, it must be corrected by basic principles of ergonomics [13,14].

Based upon the job, a bank employee has to spend on average 8 hrs. daily at the workplace with only 30-45 minutes of the break. Most of the time of the work is spent in front of the computer. The computer work will also overload the neck, shoulder, and upper limb muscles and joints. Often working in the same position for a prolonged time and prolonged neck flexion are significantly associated with neck pain [4]. It causes stress over posterior muscles, lengthening weakness of cervical flexor muscles, causing excessive stress and leverage over cervical spine. So it is important to overcome these physiological changes to avoid further degeneration in cervical spine. DCF activation which is achieved by CCF training has advantageous effect on improving posture and by decreasing the activity of SCM and Anterior Scalenae and increasing the activation of DCFs. Hence the purpose of this study is to find out the effectiveness of DCF muscle activation and ergonomic education in patients with work related neck pain [12].

## Method

The study received ethical approval from institutional ethical committee (Ref no. PIMS/CPT/IEC/2016/16558) design of the study is pretest-posttest study. The study was conducted in the Pravara Sahakari Bank Ltd.,and Central Bank of India, Loni. Inclusion criteria was males and females of age between 19 to 50 years with self-reported neck pain and performing poor on CCF test, having work experience more than 1 year of work and worked on computer for minimum 4 to 6 hrs. Exclusion criteria were staffs of the bank that are not bankers. Participants having systemic illness, previous trauma, pregnant women and having Neck Disability Index (NDI) more than 15 as well as participants who had cervical spine surgery, neurological signs in upper limb and participants who had participated in neck exercise program in past 12 months. Numeric Pain Rating Scale (NPRS), NDI, Cervical Range of motion (ROM) were outcome measures. After screening and receiving written

**Fig. 1:** Participant Perfrming Deep Neck Flexor Activation.

informed consent total 46 participants were divided in group A and group B. Group A received the Deep neck flexor activation and ergonomic advice. While group B received only ergonomic advice. Deep neck flexor activation was performed by the participants in supine lying with the pressure sensor kept behind the neck and feedback unit held by subjects.

Baseline pressure was set at 20 mmHg and subject told to perform nodding movement to increase pressure gradually by 2 mmHg. Warm up in form of stretching of neck was given.

**Result**

Very significant difference was observed for pain measured in NPRS between group A (0.9090±1.151) and group B (1.9545±1.046) ($p=0.003$). a self rated disability, measured on NDI also showed highly significant difference between group A (3.00±2.60) and group B (7.9545±2.716) ($p<0.001$). very significant difference was seen in cervical flexion range of motion of group A (46.54±2.73) and group B (46.54±2.73) ($p=0.0012$) for cervical extension Range of motion highly significant difference was seen between group A (57.045±2.171) and group B (53.90±1.925) ($p<0.001$).

**Discussion**

It stated that cranio-cervical flexion training directly activates the deep cervical flexor musculature and decreases stresses placed on the joints and other structure of the cervical region. Joint stresses may alter firing of cervical afferents with resultant changes in proprioceptive function. Other reason explained was SCM and scalene muscle activity is reduced and deep cervical muscle activity is increased following CCF training and this may alter cervical intersegmental kinematics leading to improved acuity for cervical movement [15]. Repeated activation of deep cervical flexors muscles may induce neuroplastic changes which in turn lead to improved recruitment of the trained muscle during complex functional tasks. (16) Afferent from these muscles cause endogenous options to be released and also the beta-endorphins from the pituitary gland. These secretions may cause both peripheral and central pain to be blocked. Neck exercises may allow the musculotendinous proprioceptorrs to downgrade their stretch reflex responses using operant conditioning techniques and multiple practices sessions. The intrafusal fibres may be reset, discontinuing the cycle of muscle tension, impaired circulation with metabolite accumulation and pain associated with myogenic (myofascial pain) [17].

CCF targets the DCF muscles and retraining these muscles was shown to reduce the neck symptoms and improve the ability in maintaining an upright posture of the cervical spine which in turn lead to improvement in functional status and decrease in disability [8].

Stretching of neck muscle in form of warm up may be responsible for the increase in ROM [19].

**Conclusion**

On the basis of present study, it can be concluded that deep neck flexor activation using pressure bio-feedback unit is suitable to treat neck pain in bank workers in reducing pain, reducing the disability and improving range of motion of participants.

*Limitations to the Study*

In the present study, the duration of the intervention was short. Activities of daily living and recreational activities of participants were not taken into account.

**List of abbreviations:**

WMSDs- Work related Musculoskeletal Disorders

CCF- Cranio-cervical flexion

DCF- Deep Cervical flexors

SCM- Sternocleidomastoid

NPRS- Numeric Pain rating scale

NDI- Neck disability index

ROM- Range of motion

**Competing Interest:** None

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