

Chronic Neck Pain and how to Prevent Chronic Neck Pain in Bankers by Using Ergonomics

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Abstract

Neck pain is very common and it is observed that approximately 70% of the people experiences cervical pain at any stage of their life. In many professions especially banking, paper work was included initially but with the advancement of technology and the increased usage of computer in banks has created health related problems in workers of the banks and other offices. Awkward posture and prolonged working hours on computers can lead to health problems such as fatigue, eye strain and musculoskeletal disorders (MSDs). Prevalence of chronic pain is increasing due to increase use of computers and gadgets among bankers, researchers and people used laptops, cell phone. It is essential to use measures that prevent people from bad postures that lead to neck pain and back pain. This short review concluded that there is need to improve the posture among the bankers to prevent neck pain. There is an immediate need of awareness among the bankers population regarding the importance improved posture.

Keywords: Neck pain; Ergonomics; Bankers; Physiotherapy; Posture; Technology

Introduction

Neck pain is very common and it is observed that approximately 70% of the people experiences cervical pain at any stage of their life [1]. In many professions especially banking, paper work was included initially but with the advancement of technology and the increased usage of computer in banks has created health related problems in workers of the banks and other offices. Awkward posture and prolonged working hours on computers can lead to health problems such as fatigue, eye strain and musculoskeletal disorders (MSDs) [2].

Neck disorders are more common in office workers due to their work overload especially in those who are continuously using computers. Many psychosocial, physical & individual factors increases the cervical disorders related to working environment and psychosocial factors play key role in causing cervical pain [3].

Effect of cervical pain on the life style of bankers

In developed countries cervical pain is most common problem that increases the medical assistance and financial problems due to increased sick leaves [4].

Work overload effect the physical and mental health of bankers and lead to the Psychological and psychosocial problems such as anxiety and depression, mood swings, sleep disturbance & interference with the leisure activities [5].

Stoop posture with forward head position which can lead to the lordosis of the neck .Emotional stress and disturbance lead to the pain in the head and cervical region According to Ariens and colleges (2001), psychosocial work-related variables may include aspects of

content, organization, and interpersonal relationships at work, finance and economy. Individual factors act as confounders influencing the relationship between the psychosocial demands & increase chances of cervical pain which lead to the emotional and psychological disturbance [6].

Etiology of neck pain

Cervical pain can be caused by many problems to the head and neck structures such as inflammatory, vascular, degenerative, endocrinal, and infectious and neo plastic nature. Cervical pain may also due to zygapophysial joint irritation, disc herniation, and traumatic injuries that may lead to the irritation of the nerves by changes the stimulus. The awkward posture, prolonged stress poor ergonomics and chronic muscle fatigue may lead to the neck pain in the posterior region [6].

The cervical pain may arise from the stimulation of nociceptors located in the structures of the neck such as ligaments, vertebrae, capsule, muscles, nerve roots, dura & facets it may also originate from the somatic & visceral structures [7].

There are following main causes of neck pain among the Bankers

Stress: Contraction and tightness of the cervical spine muscles can be caused by emotional & physical stresses that may lead to the pain in the cervical region.

Disc herniation: Protrusion of nucleus pulposes through the annulus fibrosis Cervical Spondylosis: Degenerations may lead to the osteophyte formations & arthritic changes of the cervical vertebrae.

Obesity: Balance of the spine is compromise due to the abdominal muscles weakness.

Overuse: Is the leading cause of muscle spasm and pain in among the bankers.

Bad posture: Prolonged sitting with forward bending of the neck cause neck pain

Referred pain: Pain in the other regions most commonly in the thoracic region can be referring to the neck.

Risk factors of cervical pain

Many workers having different jobs are more prone to develop neck pain and work related upper limb disorders (WRULDs). Prevalence of musculoskeletal disorders including neck pain increases due to physical factors associated with different occupations.

Acute and chronic neck pain may also associated with work related risk factors Prolong working in a static posture or repetitive movements during work are the major risk factors for upper back pain. Prolonged bending & twisting posture are the major factors of causing cervical pain in office workers. Cervical pain is strongly associated with the work related factors such as psychosocial factors, causing mental tiredness after working [8]. Anxiety, distress, mood swings, cognitive functioning, nature of pain and stress are major risk factors for neck pain [9].

Psychosocial factors are the leading cause of converting the acute pain into chronic pain, may also lead to progression of acute pain in the upper & low back region into chronic pain [10].

Symptoms of neck pain

Subjects with cervical pain often complaints with deep aching and unpleasant feelings in lower part of neck & upper part of the back. Popping joint sounds, head ache, muscle spasm, shortening of sternocleidomastoid muscle are also common. Unilateral or bilateral cervical pain ,dizziness, head ache, tingling like feelings, burning sensations, spasm , stiffness, shoulders pain, numbness, weakness & pain in the arm are common symptoms. Less common symptoms are unexplained weight loss, head ache, fever, nausea, night sweats, blurred vision, and difficulty in writing, swallowing, talking & walking.

Cervical pain can be caused by injury. A severe injury in the cervical area may become serious or life threatening & require medical treatment if it present with other symptoms like;

- Tingling sensation
- Weakness
- Numbness

Neck pain epidemiology

Prevalence: "Prevalence gives a figure for a factor at a single point in time". Various studies have been reported the prevalence of neck pain which varies according to the samples and time frame. At some point of time 66% adults have cervical pain in their lives, 54% of most holocene 6 months from the study on 1133 people in Saskatchewan Canada [11]. Prevalence of mean six month cervical pain is 29.8% according to statistic of New Zealand .In this prevalence of six month cervical pain and back ache is 24.2% from 755,100 candidates in New Zealand, females 21.3% and males prevalence of males is 23.1% .

A systematic review was carried out on different populations in the world, in which they considered the geography and prevalence of cervical pain [12]. They identified five European studies with 26% prevalence yearly, nine Scandinavian studies having 36% and 13%

prevalence of two Asian studies. There was no significant difference among the results of European, Scandinavian and Asian studies.

Average prevalence of both men and women in 56 studies was estimated at the different time periods as 7.6% point prevalence, 12.5% week prevalence, 23.3% month prevalence, 29.8% prevalence of six month, 37.2% year prevalence, 48.5% prevalence of life time.

According to the study of local research in Gaza nearly half of the selected population of government health care workers ,was suffering with the muscle and joint pain in which men have less than three time symptoms than women [13]. According to the study of a Hong Kong research 29% prevalence of cervical pain was identified from a 300 sample, during their life time. Researches in other countries have also done to check the prevalence of cervical pain but there are some differences among the results of these studies in different countries, and it is identified that many people in different population of different countries are facing limitation in performing activities of daily living (ADLs) due to severe problem of cervical pain.

Incidence: Incidence is the number of instances of illness commencing or of persons becoming ill (or dying or being hurt in injuries, or whatever) during a given period in a specified population or is the rate at which events occur in a population

Cervical pain prevalence has assessed in many cross sectional studies but incidence of cervical pain was estimated in less cohort studies. So knowledge about natural history of cervical pain is less present.

A study conducted in South Manchester in which total yearly incidence of cervical tenderness for greater than one day was 17.9% amongst 7669 candidates of 18 to 75 years old, they have no cervical pain one month before survey [14].

Disabling cervical pain in 0.06% of total people reproduces per year. Cervical pain of approximately one third of them resolved their problem completely [11].

Women have greater incidence of cervical pain with 1.3 relative risk and confidence interval of 95% [14].

So these results give a view that cervical pain has good prognosis and it is a benign problem the underlying causes of cervical pain among the office workers using video displayed units (VDUs) are related to some factors including individual and some work related factors and the estimated results indicate that annual incidence of cervical pain is 34.4%.They also suggested that inadequately placed keyboard, mouse, monitors and improper working environment is also risk factor for the cervical pain and the individuals who are facing more psychological stress and less physical activity or less exercises are more prone to have cervical pain. They recommended that risk of cervical pain can be reduced by performing physical activity or exercises in employers having sedentary life style [15].

Biomechanics of Neck

The viscera of the neck canal consist of Spinal Cord, vital nerves and vessels, esophagus, trachea. Lymphatic and endocrine glands also present in this region. The function of the cervical spine is to give support and musculoskeletal stability to the skull, and provide protective order movement. It transmits spinal cord and vertebral through its canal. Sometimes peripheral nerves symptoms found in the shoulder, arm and hand are originated from the cervical spine.

Muscles of cervical region, Prime movers and accessory muscles of cervical spine.

Joint movement	Prime Movers	Accessory muscles
Flexion	Sternocleidomastoid	Hyoid muscles
	Longus Capitis	Scalenus Anterior
	Longus Colli	
	Anterior Rectus Capitis	
	Lateral Rectus Capitis	
Extension	Upper Trapezius	Levator Scapulae
	Splenius Cervicis	Transversospinalis group
	Splenius Capitis	
	Semispinalis Capitis	
	Semispinalis Cervicis	
	Erector Spinae Capitis	
	Erector Spinae Cervicis	
Rotation	Sternocleidomastoid	Scalenes
	Upper trapezius	Transversospinalis group
	Spenius capitis	
	Spinius cervicis	
Lateral Flexion	Scenes	Transversospinalis group
	Levator scapulae	Rectus capitis lateralis

Table 1: Tabulated muscles of cervical region prime movers and accessory muscles of cervical spine (Schafer, 1987).

Sustained posture during office work

Patient with the neck disorders mostly have the history of forward head posture. So this is the major cause for the cervical pain along with the cervical flexion. Forward head postures also cause the headache which consist of chronic tension-type, cervicogenic and post-concussional type headaches. 25 patients reported the chronic tension-type headache in this research due to the cervical mobility and forward head posture and in 25 healthy persons [16]. Proper musculoskeletal balance is achieved when there is minimal amount of stress on the body and this is termed as proper posture [17]. Workers using computers and sitting for long time usually have forward head position. Vicious cycle between the cervical pain & higher muscle loading may lead to the forward head posture in effected persons. Some researchers suggest that symptoms of cervical pain increase with neck flexion. Positive relation found between cervical pain and cervical flexion according to a research Carried out in Dutch in which 1334 workers participated from 34 companies with 3 years follow up [18]. Strong connections lie between occipital-atlas-axis complex and soft tissues. Restriction of movement is due to any abnormality in the muscle, bone, tendons, lymph nodes, and ligaments. Excessive movement leads to tearing of tissues and lax ligaments without any muscle spasm. Para spinal muscle and ligaments provide stability to C1

-C2 joint. Instability may be due to weakening of these supports (e.g. trauma, postural stress, rheumatoid arthritis).

Flexion & extension

Excessive neck movements are contraindicated in specific area of spine. Approximately partial forward bending and backward leaning of head occur at the C0 to C1 joints and residual movements occur in remaining joints of cervical region. Since the core of the disc is closer to the front of a complete cervical vertebra, anterior-posterior movement is most noticeable in the spinous process as compared to the anterior aspect of the body of cervical vertebrae.

Flexion range: Ranges of movement at C0 to C1 joint:

- Forward bending 3.5 degree
- Backward bending 21.0 degree
- Side flexion 5.5 degree
- Rotation 7.2 degree

At C1 to C2 joint

- Forward bending 11.5 degree
- Backward bending 10.9 degree
- Side flexion 6.7 degree
- Rotation 38.9 degree (Panjabi, et al., 1988)

Extension range: The head can move to 15° in extension on the atlas without any involvement of other vertebrae of the cervical region. Usually 10° is the normal range of the cervical extension at C1 on C2.

Rotation range: Initially C0 to C1 joint move as a whole during rotation. Later on the occipital condyles can be rotated 8° to 10° on the atlas in the direction of movement when reaching end range of movement. At the level of C1 to C2 50% of the total neck rotation occur and less noticeable at the atlanto-occipital joint or C2 to C7 cervical vertebrae.

After approximately 30° rotation of the atlas around the odontoid process, the axis starts to spin, decreasing the rotation of the remaining cervical joints progressively.

Lateral flexion range: Contraction of the cervical extensors & flexors on either side of the neck results in the lateral flexion of the neck. Approximately 45° tilting occur between head and shoulder normally. Nearly 5° of this movement is observed at atlanto-occipital joint and 6° at atlanto-axial joint.

Ranges of motion C3 to C7

In the area of C3 to C7 joints, cervical forward bending and backward bending occur by the sliding of superior facets over inferior facets, accompanied by distortion of the disc. Excessive flexion occur at the level of the C4 -C5 (39°), while well distributed the extension movement. So this area is more prone to the occurrence of arthritis in middle area of cervical. Excessive rotation occurs at the C5- C6 level (34°). Lateral flexion is greatest at the level of C2- C3 (20°) and caudally decreases (15°-17°) (Schafer, 1987).

Treatment of cervical pain

Cervical pain can be managed by several methods such as physiotherapy, medications and use of modalities. Due to bank working for a long period of time, following are the treatment options for the individuals having chronic and non-traumatic cervical pain.

Physiotherapy

Many physical therapies are present for cervical pain depending upon severity and type of the cervical pain. Treatment of neck pain is done by osteopathic, chiropractic and physical therapy. The advantage of manipulation & mobilization is not obvious. Stretching and strengthening are also used for cervical pain. Therapeutic massage, acupressure and reflexology are all non-traditional methods for cervical pain.

Following are the physiotherapy treatment options for cervical pain

- Massage
- Mobilization
- Manipulation
- Traction
- Heating pads (moist or dry)
- Ice pack
- Hydrotherapy
- Spray and stretch
- Exercise therapy
- Range of motion therapy (ROM)
- Aerobic ex. Programs
- Postural correction
- Bio-feedback and relaxation
- Strengthening programs
- Educational intervention

Electrotherapy treatment

- Therapeutic ultrasound
- Thermal modalities
- Diathermy
- Infra-red light
- Electric treatment
- Galvanic stimulation
- Interferential current

Pharmacological management

Pharmacological treatment is done by medications as

1. Muscle relaxants
2. Antidepressants
3. Topical cream
4. NSAIDs (Non-Steroidal Anti Inflammatory Drugs)

Ergonomics

It is a Greek word; two words combine to form ergonomics. Ergon: work, nomoi: laws of natural. It is defined as “Ergonomics applies information about human behavior, abilities and limitations and other characteristics to the design of tools, machines, tasks, jobs and environments for productive, safe, comfortable and effective human use (Table 2) [19].

Ergonomic principle	Description
Maintain the neutral position of joints	Muscles and ligaments are least stretched in neutral position

Work should be closest to the body	When work is closest to the body, trunk will not bend forward and arms will not outstretched
Avoid forward leaning	Individual upper extremity consist of 40 kg weight, ligament and muscles are difficult to provide balance to upper part, if more leaning forward
Injured the back muscles, if trunk twisted.	Twisted trunk lead to unbearable stress to spine.
Movement and posture should be changing	Same postures for longer time and repetitive motions can produce fatigue, So prolonged and sustained posture or movement should be avoided
Prevent excessive reaches	Forward and sideways reaches should be limited to prevent forward bending and rotation.
avoid taking tasks overhead	During taking a task, elbows should below shoulder level

Table 2: Principles of ergonomics for good workplace design.

Ergonomic interfaces

Bank officers has following interfaces areas

- The chair
- The table or desk
- The monitor
- The keyboard
- The mouse
- The lightening of environment.

Ergonomic guidelines and correct posture will help to provide proper setting of these interfaces so that it promotes the abilities to do work efficiently and avoid the cervical spine injuries which are caused by repetitive stress.

Poor ergonomic set up for computer users

Computer set up faults are following

- Repetitive motions and tasks.
- Awkward and bad posture.
- Improper workstation set-up.
- Forceful movements.
- Sustained sitting posture for prolonged time.
- Improper neck, lumber and leg support.
- Monitor screen and documents are not at same level and angle.
- Improper lighting.
- Mouse and keyboard not at same level and angle.

Bank officers setting correction

Chair: Chair should have proper neck support, arm rests and lumbar support. Feet rest should be adjusted properly, and chair height should be correct so that shoulder blades support properly.

Ergonomic chair: A lot of work is done to change settings of sitting for prolong period of time

- Chair height (up/down)

- Neck-roll height (up/down)
- Air lumbar pump (inflate/deflate)
- Arm rotation (full 360 deg.)
- Front seat slider
- Arm: height (up/down)
- Arm width (in/out)
- Arm pivot (front/back)
- Chair seat tension control (tight/loose)
- Chair back height (up/down)
- Chair seat tilt (front/back)
- Chair swivel (rotates 360 deg.)

Ergonomic desk: Space should be enough to work and to push mouse around. Paper holder should be used so that books and letters maintained at eye level and semi-vertical. Documents should be placed at same height and at same level of VDT.

The lighting of environment: Lighting of the room should bright enough like a nice day or equal to the light of 20-50 foot candles. Reduce glare as much as possible. Fluorescent and incandescent light should use to decrease flickering.

The monitor: Monitor should be at 90 deg. to the windows and sources of light to reduce glare. Minimum distance of monitor should be 20 inches to avoid focusing during reading. Angle should be of 90 deg. with the floor, there should be a slight cervical flexion angle between center of screen and eye level should be maintained at 20 degree to 40 degree. Alignment of keyboard, mouse and monitor should be proper. To limit flickering refresh rate should be 70 Hz.

The keyboard

When individual sitting in a reclined position, the keyboard should be at negative angle that is below the elbow level, which prevent wrist too much bend. Use the armrest for forearm support. Avoid arm and hand rest during typing. The front of keyboard should be higher than the back of the keyboard. The keyboard should be tilt that allow wrist to remain in neutral position, Otherwise it lead to carpal tunnel syndrome (CTS).

The mouse: To make use of mouse comfortable and safer, a few guidelines should be considered:

1. For moving the mouse, not use only your wrist but involve whole arm and shoulder movements.
2. Apply soft touch while clicking, and avoid holding the mouse tightly.
3. Avoid sustained postures, use shoulder rotation and shake hands and fingers 4 or 5 times per hour.
4. Wrist position should be straight and relaxed. Height of keyboard and click button should be at same level.
5. "Left handed" mouse is made for left hander's.

Postural education

- Neck should be supported properly.
- Wrist should be in neutral position.
- During break stretch the whole body.
- Use the armrest for forearm support and parallel to the floor.
- Avoid the sustained posture.

- 10 mints per hour breaks should be taken.
- Arms should be hanged naturally from shoulders.
- Head should be at 90 deg. with the floor.
- Lean backward to make about 100-130 deg. angle with floor. In this way pressure will reduces from the pelvis.
- Knees should be a little lower than hips.
- Feet should be moving on floor not stay flat, use foot rest.
- Lumber and shoulder blades should be properly supported.

Conclusion

Prevalence of chronic pain is increasing due to increase use of computers and gadgets among bankers, researchers and people used laptops, cell phone. It is essential to use measures that prevent people from bad postures that lead to neck pain and back pain. Neck and back pain is common complain among the bankers. There is need of prevention strategies in this part of population. This short review concluded that there is need to improve the posture among the bankers to prevent neck pain. There is an immediate need of awareness among the bankers population regarding the importance improved posture.

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