

# Study on Incorrect Sitting & Standing Posture and its Implication on Neck Pain

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**Abstract** - Neck pain is fourth leading cause of disability and numbers of patients are increasing. There are many important factors for the neck pain. There are two types of neck pain acute neck pain (below 6 months) and chronic neck pain (above 6 months). The acute neck pain may decrease by treatment but 50% of this patient has further neck pain in future. Neck pain is caused due to genetic, sleeping position, bad posture of body and wrong working condition. Now days, main and serious factor is bad posture and wrong working condition. People suffering from this neck pain ignore it in the starting but in future it will be more serious. To overcome this we have to keep our neck in neutral position.

affect many different parts of body including upper and lower back, neck, shoulders [1].

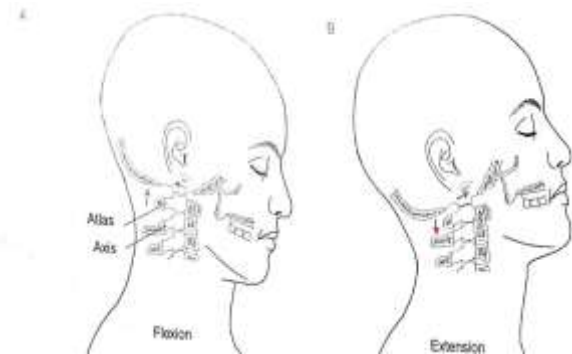


Fig -1: Joint motion of cervical region

**Key Words:** Neck pain, Musculoskeletal disorder, Bad posture, Trapezius, Spasm, Medical engineering

## 1. INTRODUCTION

Musculoskeletal disorder (MSD), It is well known and important problem in general and working condition. Overall symptoms related to MSD the neck pain is one of the most popular symptoms [7]. Neck pain is the fourth leading disability as MSD and it increases annually 30% rate [3]. The neck pain is defined as pain experienced from the base of the skull to the upper part of the back and extending laterally the outer and superior bounds of the shoulder blade [1].

There are three type of neck pain will classify according to the duration of pain Acute neck pain – below six weeks, if the pain is between six weeks to three months then it is sub acute neck pain, if more than three months then it is chronic neck pain [3]. The acute neck pain will overcome with or without treatment but 50% of people will continue the experience of same degree of neck pain.

### 1.1 What is a musculoskeletal disorder?

Musculoskeletal disorders (MSD's) are injuries or pain in the human musculoskeletal system, including the joints, ligaments, muscles, nerves and structures that support line, neck and back. MSD's can arise from a sudden exertion lifting heavy objects, vibration and also awkward position or imperfect position of neck, shoulder, back, etc. MSD's can

The cervical region (neck) is joint with thoracic region. There are two motions that are flexion and extension. The cervical spine is design for a relatively large amount of mobility. Normally the neck moves 600 times every hour whether we are awake or sleep. The motions of flexion and extension, lateral flexion and rotation are permitted in cervical region.

The forward neck posture is the main risk factor for the cervical region. Due to the forward neck posture the thoracic region tends to bend like curve called as kyphosis. To avoid the kyphosis or to protect the thoracic region we have to keep our neck in neutral position.

### 1.2 Law of lever

A lever is a rigid rod that rotates around one point to move a load by applying a force to a third point. The masses are applying a downward force on the lever with their weight – which is a force. So the simple idea of balancing weights on a pivot reveals how forces act on a lever. There are three classes of lever in human body mainly as,

- I. First class lever.
- II. Second class lever.
- III. Third class lever.

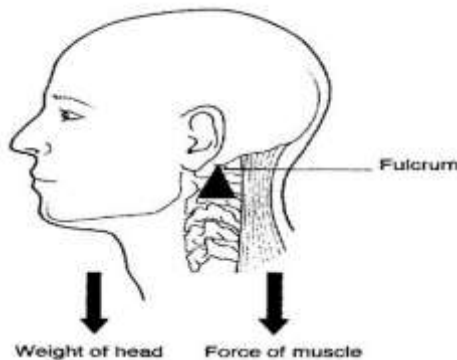


Fig -2: First Class Lever

In operation, a force is applied (by pulling or pushing) to a section of the bar, which causes the lever to swing about the fulcrum, overcoming the resistance force on the opposite side. This first class lever is applicable for the cervical region that is neck if we compare the this class of lever to the neck, the head is raised off the chest the facial portion of the skull is the load , the fulcrum is between the atlas and occipital bone, and the effort is contraction of the muscles of the back.

## 2. KINAMATIC CHAIN

A kinetic chain is the term that these joints and segments have an effect on one another during movement. When one is in motion, it creates a chain of events that affects the movement of neighboring joints and segments. Neck pain is fourth leading cause of disability, with annual prevalence rate exceeding 30%. There are acute neck pain and chronic neck pain. Most episodes of acute neck pain will resolve with or without treatment, but nearly 50% of individuals will continue to experience some degree of pain or frequent occurrences. Exercise or keep neutral position treatment appears to be beneficial in patients with neck pain [2]. Due to imperfect position of neck pain like forward neck while sitting, walking, standing and now a day's main factor is working on computers and using mobiles. To minimize risk of recurring neck pain we have to keep neck in neutral position while standing, sitting, and walking and while working so its precaution over the neck pain in future.

While many engineers or people from IT sector are continuously working on computer in imperfect neck position for long time, so that muscles of neck are get tighten or strengthen called as trapezitis or spasm. According to kinematic chain other regions are also get tighten. Due to the tighten in muscles of cervical region the motions are get blocked.

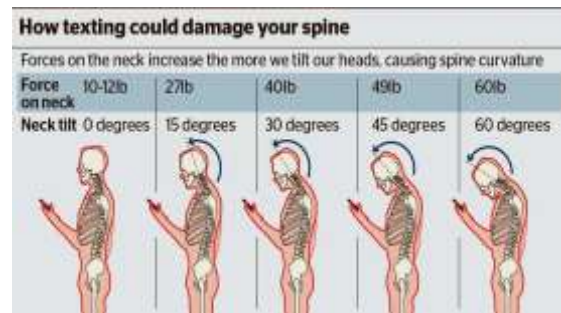


Fig -3: Forces on cervical region

## 3. DISCUSSION

Today large numbers of peoples are using computers for long time in a day. Computers are useful tool for streamlining effort as office worker no longer to need leave the desk for copy or mail or file document. It increase the probability and efficiency for specific task The trapezius muscle of cervical region have relative less time for rest during stress full task in working area. Physical workstation design and task demands, such as duration of computer use, frequency of breaks, method of keyboard operation, position of computer monitors, type and use of input devices are associated with work related neck posture(WRNP). The origin of the neck pain is definitively unknown but it may be due to the multiple factors. The common factors include physical, psychological, individual, and environmental. Public health and financial importance will be considerable for the neck pain. Chronic neck pain patients use the health care system twice a day as compare to others. The people with history of musculoskeletal low back, upper back are more likely to have neck pain.

## 4. LITERATURE RESERCH

**Bart n green** et al conclude that, very long time use of computer during daily work will causes the neck pain and its disabilities. The work related musculoskeletal disorders are the injuries of musculoskeletal tissues due to the workplace risk factor. They conclude that the peoples who spend much more time for computer work the work related musculoskeletal disorders of neck is the common problem. Neck pain is defined in this paper as pain experienced from

the base of the skull (occiput) to the upper part of the back and extending laterally to the outer and superior bounds of the shoulder blade (scapula). They said the origin of the neck pain is definitively unknown but it may be due to the multiple factors. The common factors include physical, psychological, individual, and environmental. Public health and financial importance will be considerable for the neck pain. Chronic neck pain patients use the health care system twice a day as compare to others. The people with history of musculoskeletal low back, upper back are more likely to have neck pain. The trapezius muscle of cervical region have relative less time for rest during stress full task in working

area. Physical workstation design and task demands, such as duration of computer use, frequency of breaks, method of keyboard operation, position of computer monitors, type and use of input devices are associated with work related neck posture (WRNP). If we consider the psychological studies shows that people with higher stressed are at higher risk for work related neck pain. To prevent the WRNP the computer stations are arranged in such way that the neck flexion will reduce like use the document stand, screen height, appropriate chairs, rest breaks etc.

**Grace p. y. szeto** et al suggested that, the causes of neck and shoulder pain in computer worker is due to poor neck and shoulder posture. Their aim is to evaluate and compare the neck and shoulder posture in working environment. They took two groups of female one is symptomatic and asymptomatic. They record the working posture by video and motion analysis. They have more number of head tilt and neck flexion in symptomatic group as compare to asymptomatic group. Their result shows that 10% increases in forward head posture during working on computer display. At joints and muscles due to more loading the forward head posture is the major symptom for work related neck and upper limb disorder (WRNULD). When the computer worker looking down to the display unit neck tends lower cervical flexion will increase the load on extensor muscle to support the weight of the head, as worker looking up neck tends to cervical extension will increase the load on flexion muscle. They conclude that symptomatic office worker have more forward head than asymptomatic worker which gives discomfort during working. They suggest further study is required to relate the posture and discomfort.

**Steven p** et al says, now the neck pain is 4<sup>th</sup> leading disability. There are many ways to classify the neck pain, the pain below 6 weeks called as acute neck pain in between 6 weeks to 3 months called as sub acute neck pain and more than 3 months its chronic neck pain. The acute neck pain will overcome with or without treatment but 50% of people will continue the experience of some degree of neck pain.

**Xiaofei guan** et al their aim is to identify the gender difference in cervical posture. Also they correlate the posture and the use of computer, mobile or digital devices. They took questionnaire between 17 to 33 years old age group. Then they measure the neck flexion and extension angle of male and female candidate. They found that larger neck flexion angle of male as compare to female. Now neck pain is common disorder in children as well as adults, 50 % of the individuals experience the some degree of neck pain. These neck pain symptoms may be due to the non-neutral posture of neck. The forward head posture is commonly recognized as non-neutral posture of neck. More study suggested that there is relation between bad posture due to mobile use and neck pain. Head and neck flexion this two angles are the main important measurement angles of the cervical region.

**Duc cong dang** et al they analyze the effect of gravitational force of neck flexion during walking by sensor attached to the neck. They took 20 people having no history of neck pain and discomfort during walking. For the musculoskeletal disorder the neck pain is most common disorder. The normal posture of neck is 0 degree and head weight or force is about 10 to 12 lbs, but as neck forward then force will increase as 27 lbs at 15°, 40 lbs at 30°, 49 lbs at 45°, 60 lbs at 60°. This large amount of force will increase more loading at joints and muscle this could be the major factor of neck disorders.

## 5. CONCLUSION

Now days working hours for employees are between 8-10 hours and maximum working conditions is either sitting or standing as we consider sitting working condition. Many people are seated in wrong posture it may harm to body posture. As we discuss seating in wrong or bad posture it causes kyphosis or spasm musculoskeletal disorders. To avoid this repositioning device is required to wear during working hours. Now in markets there are many devices which have low cost but not much effective and others have more cost but much effective so one device is required which is effective as well as have moderate cost and flexible.

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