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Ergonomics in Musculoskeletal Disorders Due to Usage of Mobile Phones

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***Abstract*: The number of smartphone users are increasing more and more to rapidly increasing. In this can been studied to be aimed to assess the high level of ergonomic risk factors to be mobile phone users and to estimate the correlation between some self-reported musculoskeletal disorders and the high level of ergonomic risk factors. By identifying the high ergonomics risk of smartphone users can be resulted from some two key risk factors. The major factors are posture and muscle use. The neck, trunk and leg postures had been combined effect on neck musculoskeletal disorders. In future investigations should been consider these factors and can be designing an ergonomic intervention for the smartphone users. In these project going to suggested to identify and control a musculoskeletal disorders due to usage of mobile phones in an ergonomics.**

***Keywords*: Musculoskeletal disorder, Cell phone ergonomics, Ergonomic Posture, Cell phone radiation, Ergonomic disorder and injury, Work related musculoskeletal disorder.**

1. Introduction

A smart phone device, now-a-days mostly used for communication skills and process and entertainment purposes like media, internet and playing games and include mobile phones, tablets, music players listening songs and gaming devices. Nowadays we can find person without mobile phone can multiple process usability options available in the mobile phones encourage the users to engage most of time in hand held devices. Mobile phone users can able to communicate other than voice by a wide range of text button by means of Short Message Service, Texting is used for mobile data service of all mobile phone users worldwide being active users of it. Literature reports can adverse impact on the physical and psychological health of the users of mobile and information technology also. The problem of musculoskeletal disorders of hand, wrist, forearm, arm, and neck has been increasing all over the world. It shows mobile design and anthropometry of the user in causing discomfort and fatigue in hand, elbow and shoulder while using the hand held device. Studies have revealed a high incidence of musculoskeletal disorders of hand, wrist, forearm, arm and neck has been increasing all over the world. Although no studies have been reported in case reports and laboratory studies risks to musculoskeletal health as a result of mobile device usage. And finally in these paper was done to evaluate risk factors and clinical features of the musculoskeletal disorders due to usage of hand held devices.

2. Musculoskeletal disorders (MSDS)

Musculoskeletal disorders can be caused by injuries and cause pain in the human musculoskeletal system including joints, ligaments, muscles, nerves, tendons, and structures that support limbs and neck.

1. MSDs can sudden exertion by lifting a heavy object.
2. It can make the same motions repeatedly repetitive strain and repeated exposure to force, vibration and awkward posture.
3. Injuries and pain in the musculoskeletal system caused by acute traumatic events like car accident.
4. MSDs can be affected by parts of the body including upper and lower back, neck, shoulders.

A. Causes of Musculoskeletal Disorders

1. Trauma an area forms a jerking movements, auto accidents, falls, fractures, blows to the muscle also can cause musculoskeletal disorder pain.
2. In these other causes of pain include postural strain and repetitive movements.

B. Symptoms for Musculoskeletal Disorder

The symptoms for musculoskeletal disorder causes by following factors. They are

1. Aching of the entire body.
2. Stiffness of entire body.
3. Feeling that your muscles have been pulled or overworked.
4. Fatigue.
5. Sleeping disturbances.
6. Twitching a muscles.

C. Postures of MSD

1) Good Postures of MSD

1. Keep your hands, wrists, and forearms straight and parallel to the floor.
2. Keep your head level, facing forward, and in line.
3. Your feet should be supported by the floor and your thighs and hips supported by a padded seat.
4. If you are sitting it is important to have your lower back supported.

2) Poor postures of MSD

1. It can elevated shoulders and a pushed forward head position.
2. It become stress on spine between top of the neck and skull.
3. It become a forward tilted hips.
4. In an increasing curve of the lumbar spine, and a protruding stomach. It places stress from hip joints and lower back.

D. Work Related Musculoskeletal Disorders

In a risk factors for Work-related musculoskeletal disorders are associated with factors are

1. Work postures and movements.
2. Repetitiveness of work.
3. Force of movements.
4. Vibration moments.
5. Lack of influence.
6. Increase pressure and temperature.
7. Lack of poor communication.

3. Ergonomics

A. Ergonomic Disorder and Injuries

Ergonomic injuries are those injuries caused by ergonomic risk factors are:

1. Awkward postures
2. Strain
3. Contact pressure
4. Exposure to vibration
5. Exposure to heat and cold

In these risk factors contain lead to pain and injury. An injury occurs exposure to ergonomic risk factors. Repeated exposure to risk factors, on other hand can interfere with body normal healing process and produce to an ergonomic injury. Ergonomic injuries may be referred to as Repetitive Stress Injuries, Repetitive Motion Injuries and Musculoskeletal Disorders. Ergonomic injuries and MSDs can affect the muscles, nerves, tendons, ligaments and joints. Now a days we spend more time on the computer in each day at work and at home to prevent these Musculoskeletal Disorders.

B. Symptoms of an Ergonomic Injury and MSD

1. Pain in the fingers, wrists, other parts of the body can be including a dull aching pain.
2. Particularly in the hands and fingers.
3. Loss of muscle function and weakness.
4. Discomfort and pain in the shoulders, neck, upper or lower back
5. Feeling muscle tightness and discomfort
6. loss of coordination
7. Range of motion loss
8. Discomfort when making certain movement.

C. Cell phone Ergonomics

Ergonomic use of smart phones devices for school and work can bring great benefits for healthy habits to use move. A proper adjustment of equipment can help prevent work stress and disorders as Carpal Tunnel Syndrome, Back and Neck Pain by using Smart phones.

1) To avoid muscle tension in neck

1. Avoid holding the phone between ear and shoulder.
2. Use headset microphone to avoid awkward postures.
3. Hold the phone at chest height to get neck in line with back.

2) To avoid muscle tension of fingers

1. Alternate between thumbs and other fingers.
2. To keep wrists straight and relaxed to hold then use device.

3) Effect of electromagnetic waves on human brains

A smartphone is a source of eminence of electromagnetic waves. It can be identified by the effect of electromagnetic waves and it can be emitted from mobile phones on human health. But it touched narrow circle of people while mostly an broadcast and radio stations. It can be measures to protect people from high radiation to apply only on working near powerful source of radiation.

4) Tips to Reduce Cell Phone Radiation

1. Wired technology is a safe technology. To ensure have a home corded landline phone and with wireless functions turned off.
2. A home cordless phones emit radiation like cell phones, so every home should have a corded landline.
3. To use a cell phone for social media, music we recommend using your corded ethernet computer for these uses to minimize cell phone use.
4. We do not know a safe level of cell phone radiation. So must use a cell phone, please reduce exposure with the strategies listed below.

5) Avoid using your mobile phone when no signal

When moving at high speed in vehicles as car, bus, train or airplane as automatically power increases to emit a maximum amount of radiation because phone repeatedly attempts to connect nearest network antenna.

6) Avoid carrying your mobile phone on your body at all times

Do not carried powered on cell phone in pocket. Cell phones emits radiation. Power hundred percentage off before carrying near your body.

7) Children Should Use Cell Phones for Emergency purposes

Children skull are most thinner than adults and their brains still developing. So radiation from cell phones more deeply into their brains and is likely to cause more damage.

8) Do not sleep with your cell phone powered on

Research shows while sleeping is disrupted by cell phone radiation. Need an alarm clock Simply set the phone to airplane or flight mode.

9) Use your home and office corded landline for most conversations

When use mobile phone to landlines in home we should power off the mobile phone without missing a call. So, most cordless phone base stations constantly emit microwave

radiation regardless any connected handset is in usage.

10) Read Your Cell Phone Manual

To find minimum distance the federal government as cell phone must be away from your body. Keep closer distance can result in a violation of the FCC Exposure Limit as burns and brain damage.

D. Purposes of Smart phones

1. *Communication:* Smart phones from communication devices has been created improve people way of communication with other. The way to SMS, text message, calling, video chat, and apps are allowing people to communicated to all.
2. *Web Surfing:* A smart phones has easily convenient for people for using. These devices are integrated with mobile browsers to research and websites anytime. The smart phones are used in opening browsers to internet have easy access information.
3. *Camera:* In this generation the camera is important and save people from buying a separate digital camera to take photos and videos.
4. *Entertainment:* A Smart phones is a source of entertainment as games, music, movies, and books. Now a days users can listen favorite music with iTunes, Watching movies and reading books for convenient through mobile phones.
5. *Education purpose:* Smart phones is aid education for children. It is easy access to information and helpful for children can have a more interactive learning through watching education videos and playing education applications.
6. *Productivity Apps:* Smart phones can do everything with the help of apps. People spend high percentage of time by using apps an average user and apps on their smartphone. The function of apps from photo and video editor, ticket booking, online store and data analysis.
7. *GPS:* Most smart phones now a days are equipped with Global Positioning System. In this technology allows people to locate certain addresses and area all around the world and helped improved not just communication, but for transportation.

E. Key points about attempting to changing texting position and reduce your pain

1. Keep the phone correctly at eye level and it helps to keep cervical spine in high neutral position.
2. Minimize the amount that arms are floating in front of the body. This tends to engage shoulder muscles can engage the neck muscles.
3. To find a place to rest your elbows.

1) Standing and texting

1. Stand tall and roll your shoulder back and down.
2. Place your left hand on your right rib cage
3. Using right hand to view your phone and swipe with thumb.
4. Switch sides to avoiding overuse and fatigue.

2) Sitting and texting

1. Move to the front of your desk or chair and lean forward with a flat back.
2. Hold your phone at eye level and correct manner.
3. Push down with your elbows into your knees and engage your back muscles.

4. Conclusion

In the results of our study clearly indicated the presence of musculoskeletal disorders of the upper extremity following usage of hand held devices. This is in accordance with studies reported in these literature. These motion occur in three dimensions and as a result it becomes difficult to measure the kinematics of thumb. Now a days mobile phone devices used for an integral part of the most people for living. In these influence of mobile phones and effects on human health are being tested. There is no opinion for mobile phones bring harm to human's health condition factors. So addiction on cell phones carry some risks on human development and health. By conducting this research, tried to bring attention to potential risks that cell phones can cause users and provide some solutions how to mitigate side effects of cell phones and mobile devices on the users by limiting cell phones and handheld devices usage. The advancements of modern technology, particularly, handheld devices as smart phones are tremendous. So, use of devices may cause symptoms of the musculoskeletal disorder, thumb and neck. This systematic review revealed that the use of smart phones may contribute to the occurrence of clinical and subclinical musculoskeletal changes as well as associated factors in the head neck, shoulder arm, and hand thumb areas. While there is a strong case present in finding all studies reported in this review, the evidence must be considered in the light of the moderate scores from black check listed.

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