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Original Research Article

Ergonomic Awareness about Use of Electronic Devices in IT Professionals

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ABSTRACT

Ergonomics is a very important part in today's world leading to health problems. This survey focused on the ergonomic awareness in IT professionals to know whether they followed the ergonomic modifications while working on different electronic devices.

Method: A survey was carried out among the IT professionals using self administered questionnaire. 100 subjects were invited for the study.

Result: 32% were unaware of their postures related to upper extremity. 37% kept Monitor/screen of computer or laptop improperly with respect to eye level. 86% people experienced different MSDs which could be attributed to the faulty postures and their unawareness of ergonomic modifications.

Conclusion: Data analysis concluded that majority of the subjects were unaware of ergonomics and faced different health problems. Also they were aware that improper ergonomics led to these discomforts. Hence, it is important to become aware about the ergonomics to prevent MSDs.

Key words: Ergonomic, awareness, IT professional

INTRODUCTION

Ergonomics is the study of human responses to their work while working in their working stations. [1] More specifically, ergonomics is the science of designing the job to fit an individual rather than physically forcing his/her body to fit the job. Health and safety is maintained by practicing ergonomics, which improves working efficiency, comfort and easiness to work. A workplace, which is ergonomically deficient, may not cause any discomfort immediately, because the body adapts to a poorly designed workplace to some extent. But in long term, poor quality of work, altered body's mechanisms, pain, decreased performance are the cause of the workplace designed unergonomically. [2-3] E.g. the position of the mouse should be such that the user should maintain a straight, neutral wrist position such that strain injuries, posture disorders like Carpal Tunnel, Tendinitis, Lateral epicondylitis (tennis/golfer's elbow) are prevented. [10] In today's world, it's almost impossible to imagine that one can live without computers or any electronic devices (laptops, mobiles). They have become every day use for individuals of every age. Inappropriate use of computers while in work stations increases the risk of health problems. Musculoskeletal Disorders (MSDs) are the results of working in the ergonomically deficient environment or workplace for prolonged time. There is 25 percent increase in the individuals suffering from MSDs in last 10years. [4] Majority of these musculoskeletal conditions is related to computer use, thus ergonomics is a concern in today's time and everyone should be aware of all ergonomic modifications. [5] A little knowledge of ergonomics can prevent

a lot of discomfort and increase productivity and efficiency.

In India, Ergonomics is a new concept and yet to be considered by many people as an essential component. Today's generation is the future and they are more likely to enter the work force with poor computing habits or even a MSD without some intervention, hence the findings of this study can form a foundation for future research and ergonomic training to people. There is decrease in stress and strain on the muscles, tendons, and skeletal system because of working with posture in which joints are in neutral position. [6-7] The chair is the base for comfortable computer work. It must fit the user and be suitable for their tasks. When selecting the chair, users should be aware of the lumbar support that should be large enough to support the entire back including the lumbar region. The lumbar curve should be adjustable along with the height and tilt of the chair. [8]

Aims: To check ergonomic awareness about use of electronic devices in IT Professionals.

Objective: To check whether people are aware about the ergonomic modification to be done in their working stations and do they follow respective ergonomics while working on their electronic devices like do they use proper table height at which the computer/laptops are placed, or do the use proper chair height and whether the screen is at the level of eyes etc.

MATERIALS AND METHODS

This study was conducted to identify the ergonomic awareness amongst the IT professionals using different electronic devices. A proper questionnaire was emailed to 100 people in the form of Google forms to check whether they are aware of the ergonomic modification or postures they acquire while working in their work station while using different electronic devices.

Statistical/Graphical Analysis:

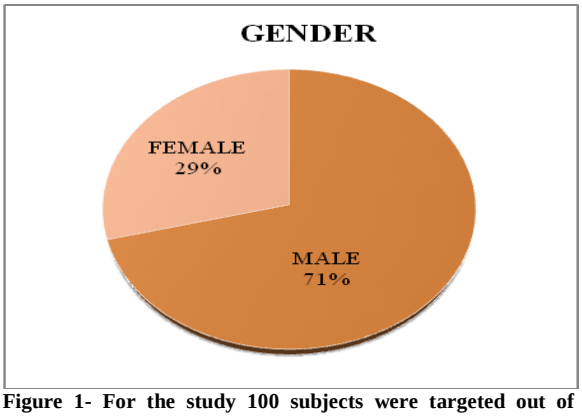

Figure 1- For the study 100 subjects were targeted out of which 71% of the total were Male and 29% were Females

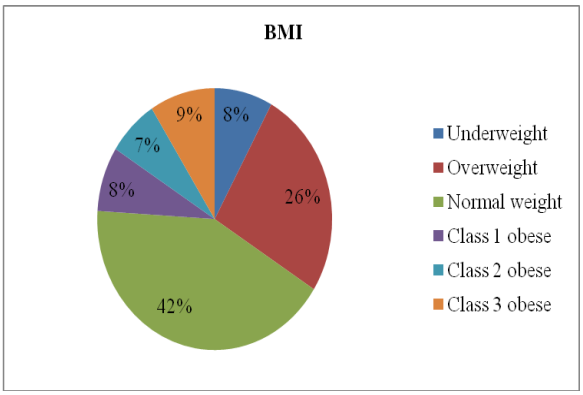

Figure 2- About 8% of the total subjects were underweight and 50% were overweight which include 8% class 1 obese 7% class 2 obese and 9% class 3 obese.

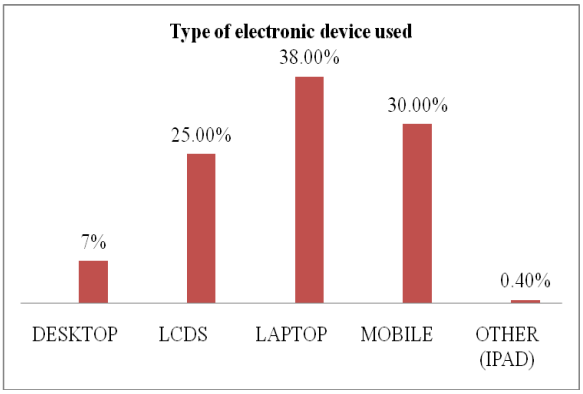

Figure 3- About 68% of people also use laptops and mobiles along with LCD screens on daily basis for their official work.

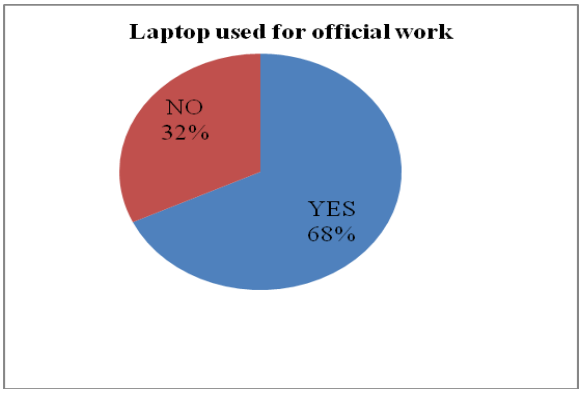

Figure 4- Nowadays laptops have replaced monitors or desktops. About 68% of the people also use laptops on daily basis for their official work along with other electronic device.

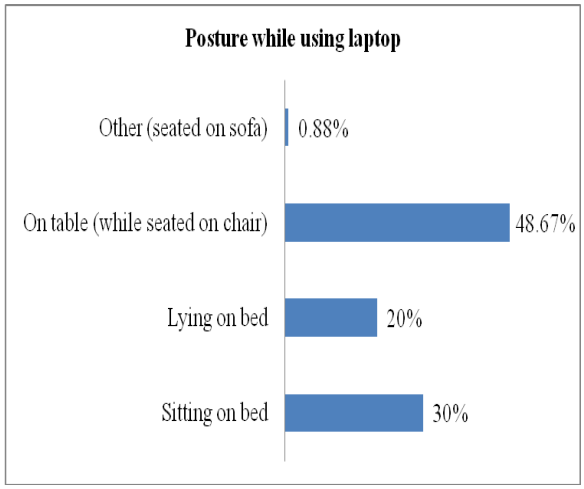

Figure 5- Around half (48%) of the population uses laptop on table while they are seated on chair and 50% of the people acquire improper postures while using laptop (20%lying on bed, 30% sitting on bed)

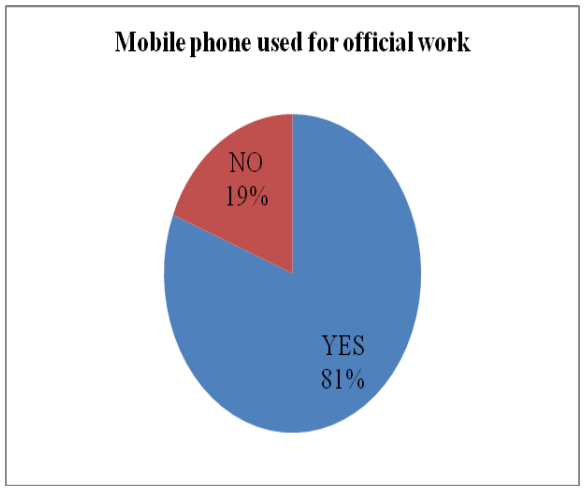

Figure 6 - 81% of the total subjects use their mobile phones too for their official work. As nowadays emails and messaging, majority of the times is done by our mobile phones.

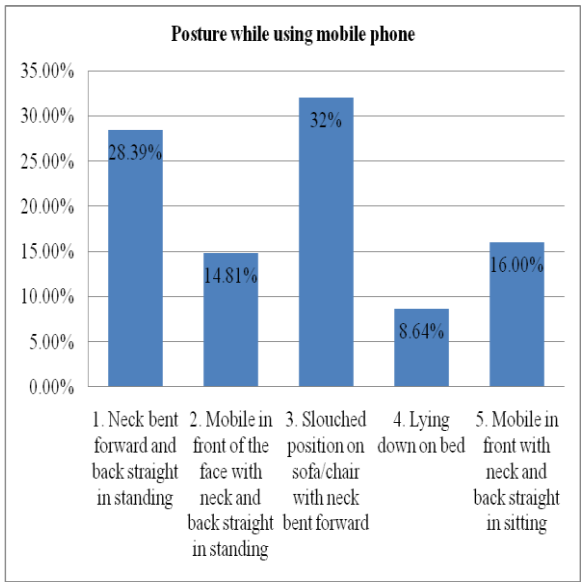

Figure 7- Only 31% of the people attain proper posture while using their mobile phones (2, 4). And around 69% of people attain wrong posture while using their mobiles.

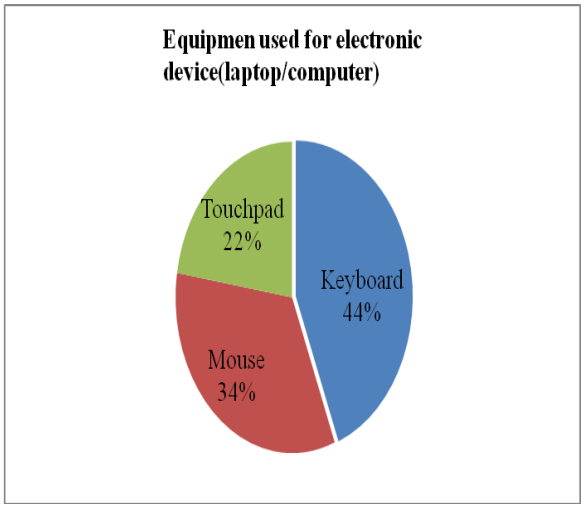

Figure 8- 78% of people use keyboard along with mouse for their electronic device.

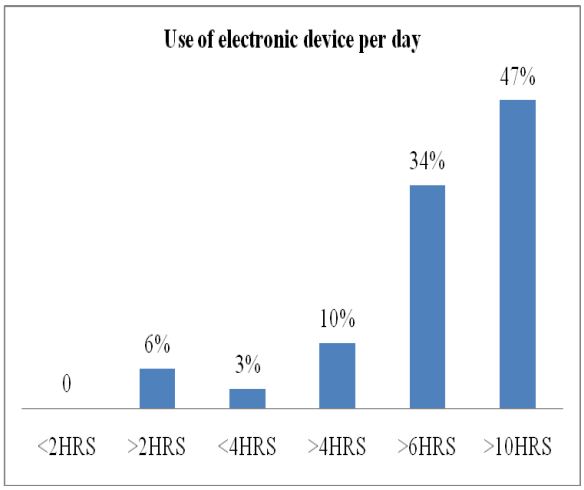

Figure 9- 47% of the total subjects use their electronic devices for more than 10hrs. These people often face different musculoskeletal problems due to prolonged sitting.

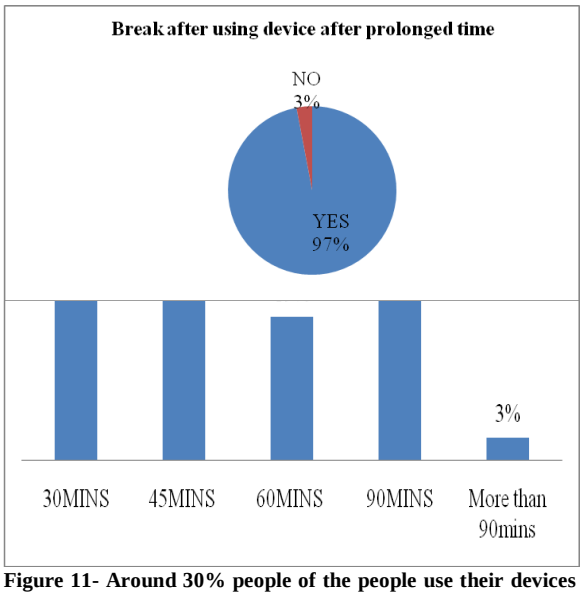

Figure 11- Around 30% people of the people use their devices for continuous 90mins without taking any break. Around 24% people take breaks after 30 to 45mins of their continuous usage of electronic devices.

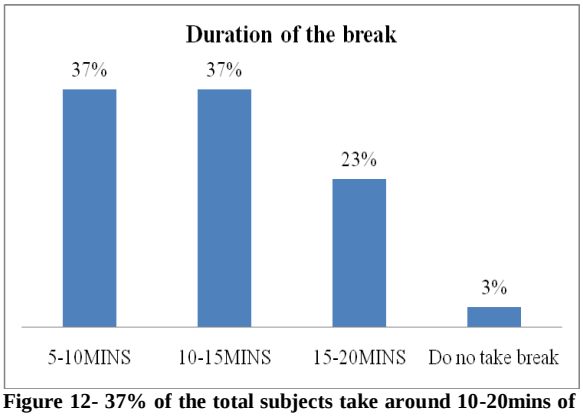

Figure 12- 37% of the total subjects take around 10-20mins of break after using the devices for prolonged time.

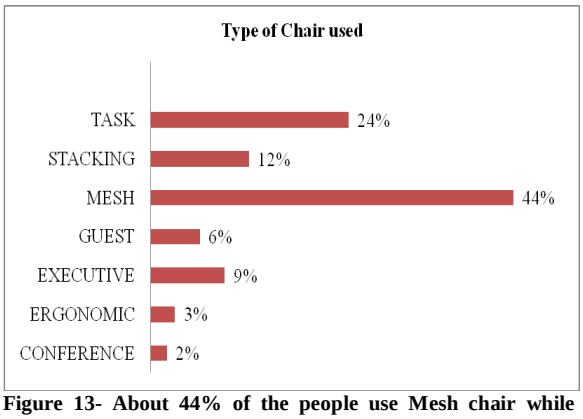

Figure 13- About 44% of the people use Mesh chair while using laptops LCDs etc and only 3% of the people use proper ergonomic chair with proper lumbar support, arm rest, and cervical support etc.

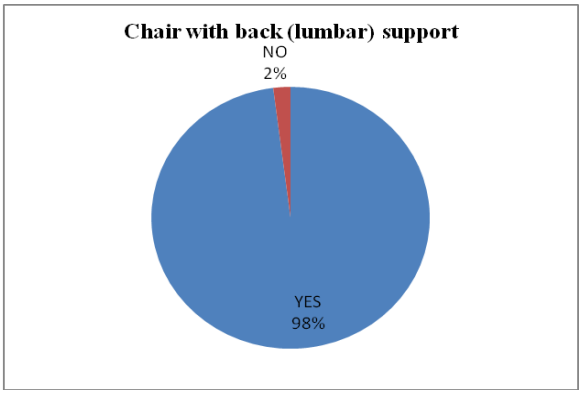

FIGURE 14- Almost everyone (98%) uses a proper chair with back (lumbar) support.

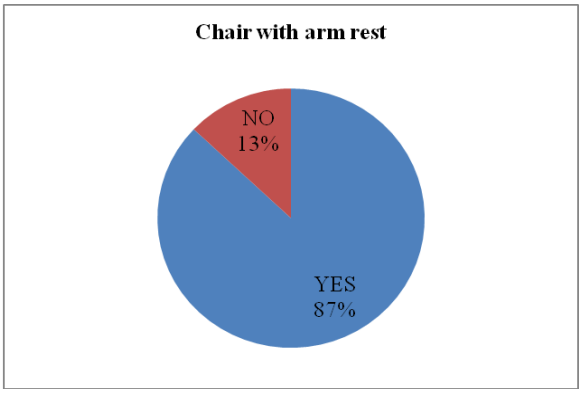

Figure 15- About 13% of the people using chair does not have arm rest which may result in MSDs of arm/forearm/wrist.

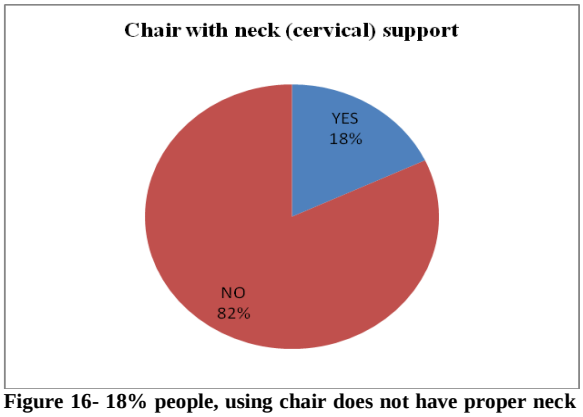

Figure 16- 18% people, using chair does not have proper neck (cervical) support.

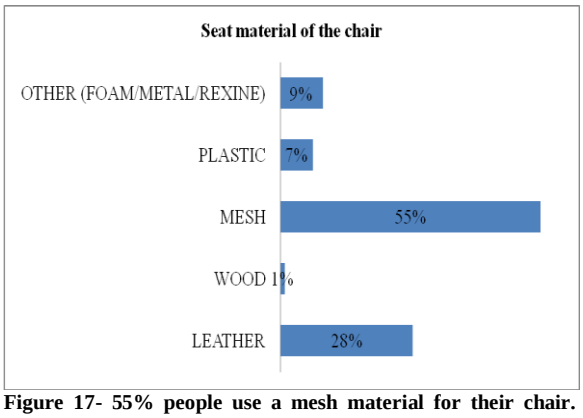

Figure 17- 55% people use a mesh material for their chair. 28% of the people use leather for their chair. 8% people use plastic and wood chairs which is unergonomic.

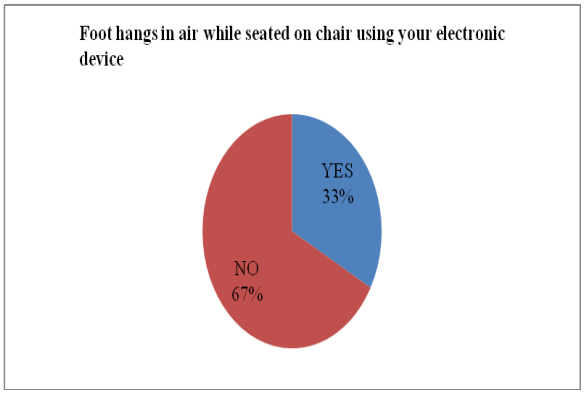

Figure 18- 33% of the people's foot hangs in hair while they are seated on chair using their electronic device.

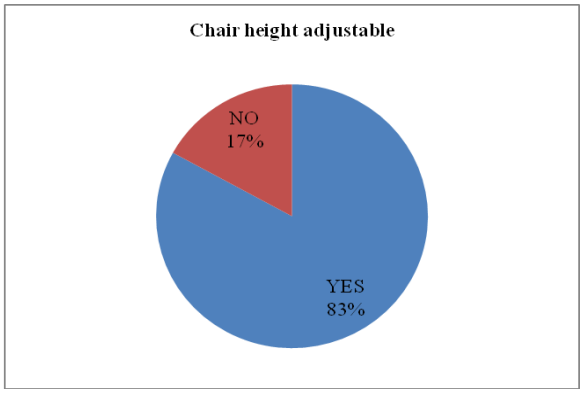

Figure 19- 17% of the people's chair height is not adjustable. This shows that the people are not aware of the ergonomic importance while working in their work stations.

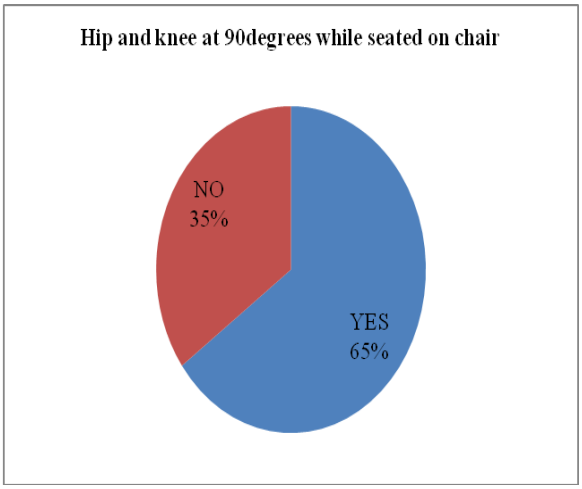

Figure 20- 35% of the people's hip and knee is placed either more or less than 90^0. This can be because of the foot not supported properly or because of the unadjustable chair height.

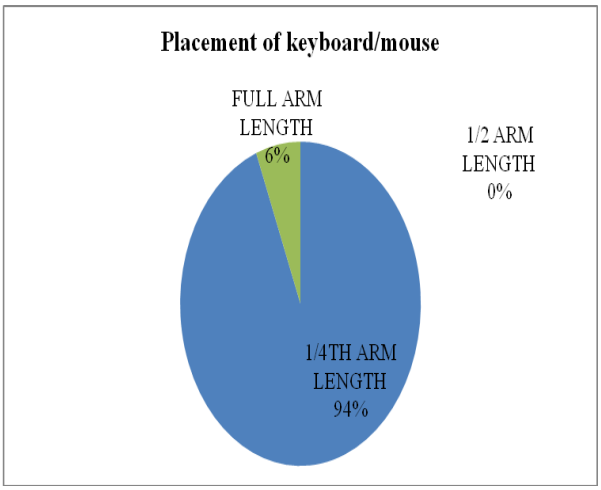

Figure 21- 6% of the people's keyboard/mouse is placed far from them.

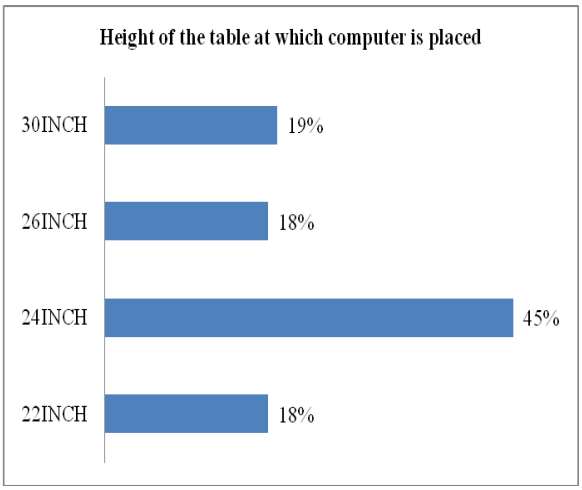

Figure 22- Most of the people (81%) use inappropriate height of the table at which their laptop or computer is placed.

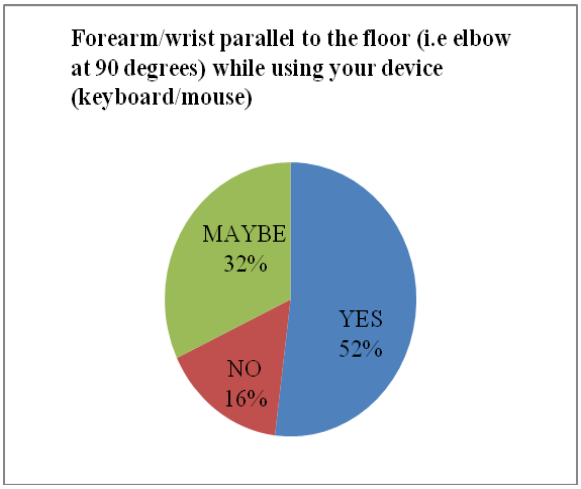

Figure 23- 32% of the people are unaware about their arm/forearm position. 16% of the people have inappropriate positioning of their arm/forearm.

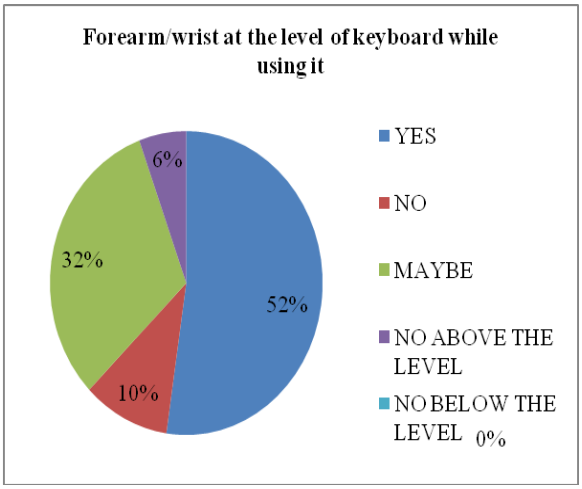

Figure 24- 16% of the people's forearm is not at the level of the keyboard (6% below the level).

Figure 25- Only 23% of people use correct distance of the computer screen from eyes. 77% of people's computer screens are wrongly placed away from the eyes.

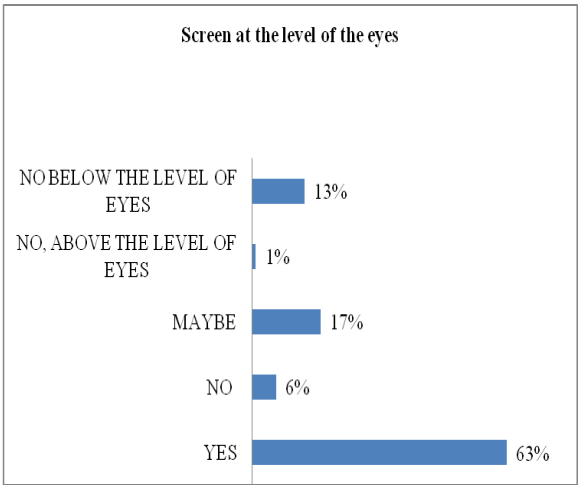

Figure 26- 63% of the people's computer/laptop screens are placed at the level of their eyes. And 20% of the people's screens are placed at inappropriate height.

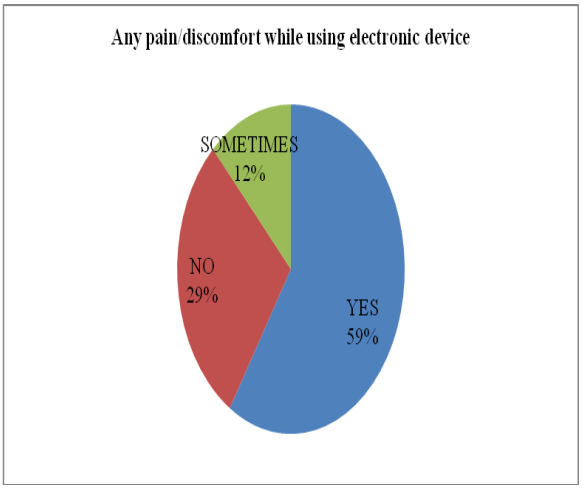

Figure 29- More than half (59%) of the total subjects experience discomfort while using their devices for prolonged time. And 12% of them sometimes experience MSDs.

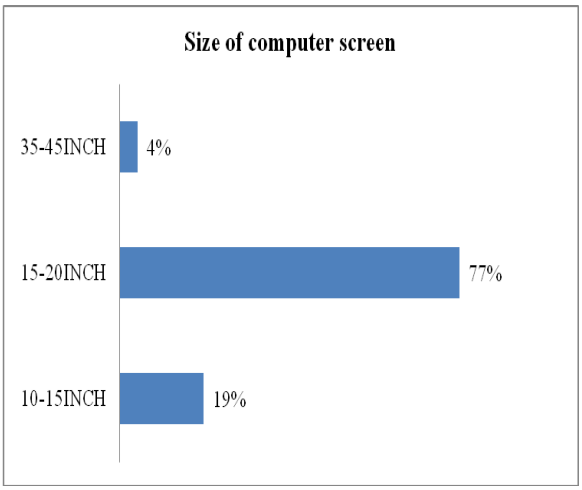

Figure 27- 96% of people use inappropriate computer/laptop screens. And only 4% of the people use 35-45inches screen which is ergonomically correct.

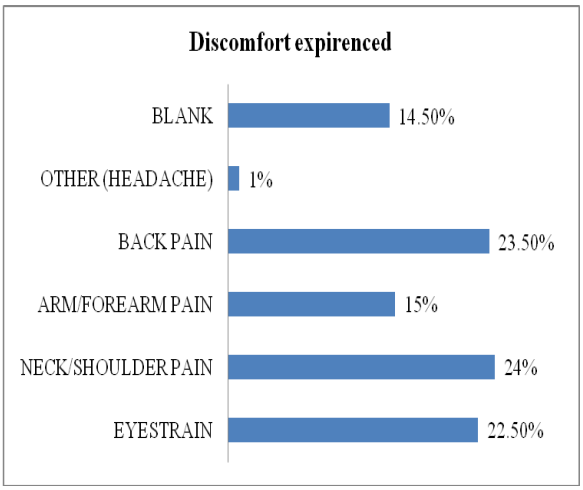

Figure 30- More than 80% of the total subjects faced different kind of discomforts in various permutations and combination.

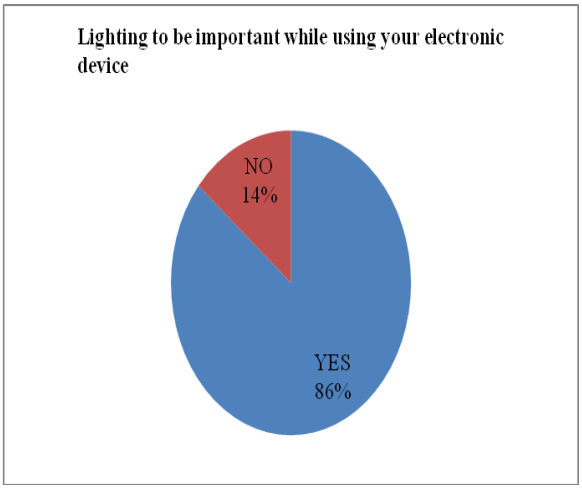

Figure 28- 14% of the people do not give importance to the lighting while using their electronic devices.

RESULT

The results of this study showed that majority of the subjects were unaware of ergonomics. And majority of them didn't follow the modification. Their postures related to arm/forearm were unergonomic and people were unaware about their postures. Computers/laptops were placed inappropriately away from the eyes and also people used improper computer/laptop screen size. Because of these faulty ergonomics and unawareness of the modifications to be done, people experienced discomfort in their body.

DISCUSSION

The study was conducted to know ergonomic awareness amongst people who work on computers. Most of the people are

unaware of their postures or use inappropriate postures while working in their work stations. Improper workstation design and faulty postures are risk factors related to computer use or any electronic device. Extended period of static sitting postures causes decreased circulation, stiffness and pain in the joints. Cumulative trauma disorders are the result of prolonged duration of continuous work which may result in disability. [5]

In the study of 100 subjects, 8% were underweight, and 50% of them were overweight.

There needs to be flexibility in the way we sit at computer workstations. While there is not one correct way to sit at a workstation, seating should support postures that can be changed frequently within a comfortable range throughout the day. Visual demands, Workers' individual differences should be accommodated along with work being done properly. This will decrease fatigue and strain on the neck, shoulders, back and legs. They should try different positions to work out the best set up for them.

Almost half (47%) of the total subjects use devices for more than 10hrs in inappropriate postures without taking regular breaks which results in musculoskeletal problems of back and neck etc. There is increase risk of heart disease, diabetes, obesity due to prolonged sitting.

People should follow 20-20-20rule. The 20-20-20 rule suggests that after every 20 minutes, the computer user should take a break for at least 20 seconds and look at objects that are 20 feet away.

Also most of the people use inappropriate chairs with improper chair heights while using different electronic device with adopting inappropriate postures like bending forward on table while using mobile, or computer screen/laptop placed at wrong height or attaining slouched position while using laptop/mobile etc, this results in back pain or herniation of the disc between vertebras.

13% do not have arm rest on the chair they use while working on their computers or laptops which results in arm/forearm discomfort leading to elevated/rounded shoulders; it may also result in carpal tunnel syndrome or tendonitis.

The lower back should be supported to prevent slouching. The first step should be that people should sit on the chair fully with their lower back touching the lower part of the chair. The next step is to make sure that the low back curve is supported either by the curve of the chair back or a small pillow or cushion should be placed. Elbows should be supported at a natural height on the armrests with hips and knees approximately at 90 degrees, and the trunk should be upright. 18% people do not have neck (cervical) support in the chair they use, which results in postural strain. One of the most important factors in preventing neck pain while working at your computer is maintaining proper posture. Many people only have the option to sit at their workstations. Unfortunately, significant postural strain in the neck, back, and shoulders may occur because of sitting for several hours. 33% people's foot hangs in air while seated on chair. It may be due to improper/unadjustable chair height (17% user's chair's height is not adjustable) which prevents positioning of hip and knee at 90^{o} resulting in knee discomfort and other MSDs.

When the upper and lower legs form a right angle with each other and the two feet are flat on the floor next to each other than the chair is said to be at right height. When seated, the entire seat of the chair should be taken so that the back is supported properly by the backrest. Therefore, one should slide all the way to the back of the backrest.

If the individual's feet cannot be placed flat on the floor a proper foot rest should be used. The correct height of the footrest is the distance the feet are off the floor after adjusting the seat height.

A footrest should be non-slippery surface and large enough so that both feet rest comfortably, have an adjustable slope to allow a comfortable ankle position when feet are resting on it.

6% of total subject's keyboard is placed far from the body. It is mainly because of the improper height of the table at which the computer/laptop is placed. Keyboard's height should always be in a position such that elbow is in 90° flexion. [9] Mouse should be at the same height as the keyboard. The arm should be close to the body with proper support and parallel to floor. Computer injuries develop from repeated stress and strain to the body's muscles, tendons, ligaments, joints and nerves due to faulty postures. Arms and hands are most commonly affected.

30″ inch is the ideal height at which the computer should be placed. It is the standard height of computer desks. But the keyboard should be at 26″.

While working with laptop, the keyboard should be at 26″ high which means the laptop needs to be placed at a height of 26″ to avoid forward bending.

20% people's screen is placed inappropriately.

Overhead glare and the exposure to forceful exertions and awkward postures decrease with appropriate monitor placement. This reduces possible health risks such as excessive fatigue, eye strain, and neck and back pain. The monitor should always be at the level of the eyes.

More than half (77%) of people's screen is placed inappropriately away from the eyes leading to headaches or strain on eyes. The monitor should be placed at a comfortable distance from the individual, where he/she can easily read all text with head and trunk in an upright posture and back supported by the chair. Generally, the ideal viewing distance should be between 20 and 40 inches from the eye to the front surface of the computer screen. [8]

96% of people use inappropriate computer/laptop screens. And only 4% of the people use 35-45inches screen which is ergonomically correct.

14% people do not give importance to lighting while using their devices which may lead to eyestrain and headache and they may also have to face other musculoskeletal discomforts (around 40% of the subjects face different musculoskeletal discomfort in different permutation and combination).

CONCLUSION

The overall study shows that people are not aware of the ergonomic modifications to be done while working in their work stations and because of unergonomics and bad postures they experience different musculoskeletal disorders in. People use wrong table height at which the computer/laptop is placed. This results in eyestrain and headache. Many people did not have proper chairs with cervical support, arm rest this shows that they are unaware about the importance of using a proper chair.

Many people experienced different kinds of discomforts like neck pain, back pain etc it is all cause of the bad postures, not using proper chairs for sitting, inappropriate height of the chair, table at which the screen is placed.

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