Original Article

Awareness of Ergonomics among Remotely Working Information Technology Professionals During COVID-19 Pandemic: A Cross-sectional Survey

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Abstract

Background: Ergonomics is the scientific study of human work. The objective of ergonomics is to obtain an effective match between the user and workstation to improve working efficiency, health, safety, comfort, and ease of use. **Aim:** The aim of this article is to assess ergonomic awareness among information technology (IT) professionals who are working remotely. **Materials and Methods:** A cross-sectional survey was conducted among IT professionals through a self-administered questionnaire. A total of 150 subjects were recruited in the study. The results were summarized using descriptive statistics. **Results:** Majority (75%) of the total subjects work for 7–9 h in a day for 6 days in a week without taking breaks at regular interval. Only 7% of the total participants utilized break for stretches and 21% participants walk around during break. The distance of monitor from the eyes of 18.66% of the participants was between 21 and 30 inches and for 2% of the participants it was greater than or equal to 31 inches; this shows that the majority of the participants did not place their monitor at appropriate distance. The study showed that there is lack of knowledge of sitting posture among the IT professionals working from home: 9% of the participants were lying on bed, 16% were seated on sofa, and 17% were sitting on bed. Chairs used by the participants in the study were 15.33% wooden, 19.33% plastic, and 13.33% other types. **Conclusion:** It was found that those majorities of the participants were unaware about the correct ergonomics and were unable to make modifications in their workstation.

Keywords: *Awareness, Ergonomics, IT professionals, Remotely working*

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Introduction

Ergonomics is the scientific study of human work.[1] More specifically, ergonomics emphasizes on fitting the job according to an individual rather than physically forcing his/her body to fit the job.[2] The goal of ergonomics is to provide an effective match between the user and the workstation in order to promote productivity, health, safety, comfort, and ease of use.[3] Health and safety are maintained by following ergonomics and this enhances working efficiency, comfort, and easiness to work. Discomfort is not caused immediately when workstation is ergonomically deficient because the body has the tendency to adapt poorly designed workplace. In the long term, poor quality of work, altered body mechanics, pain, and decreased performance can result from poorly designed workplace.[2] Neglecting ergonomic principles can result

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in inefficiency, pain, disabling injuries, and urging one to change one's profession.

Working in an ergonomically deficient environment for an extended amount of time can result in musculoskeletal disorders (MSDs). Over the last decade, the number of people suffering from MSDs has increased by 25% worldwide, as majority of these MSDs are linked to computer use. The risks include both improper workstation design and faulty posture as prolonged sitting for extended periods leads to poor circulation, stiffness of joints, and pain. Long hours of continuous work can raise the risk of injury, and repetitive strain injuries can lead to long-term impairment if left untreated. A basic understanding of the principles of ergonomics, workstation design, and exercises can help individuals save from a lot of pain and increase their productivity.[3]

Knowledge of ergonomics is a must in today's world, when the job of an information technology (IT) professional is to sit in front of a computer screen for long periods of time. It is therefore necessary to educate and regulate them in order to avoid specific risk factors that can aid in the improvement of various symptoms and disorders. When ergonomics information is effectively utilized, it can help achieve productivity and health goals.[4]

An individual's ideal posture while working at a workstation should be an upright seated position with right angles at the ankles, knees, hips, and elbows. Working in the same or static posture for long periods of time is not healthy. The strain on the backs of the user's legs can be substantially reduced with proper height adjustments and well-padded and rounded edges on the front of the seat pan. Backrests should give enough lumbar support as well as clearance for the buttocks. Adjustable height and inclination are required to support the back in a range of sitting positions. Pressure on the undersides of the forearms and elbows can be reduced with proper height adjustment and armrest cushion. To avoid neck and eye strain, the computer monitor must be properly positioned.[5]

The current global situation of the COVID pandemic has forced millions to work from home. When an individual is remotely working, the environment is not the same as that of the actual workstation to maintain the ideal posture while working and follow all the ergonomic advices. Many of them work at home on laptops from makeshift workstations, often at the kitchen tables or on the sofas. While remotely working may help to protect IT professionals from the situation, it is also leading to unexpected consequences. Individuals must be aware of the ergonomic changes which are necessary to avoid the consequences and they must know the easy way to modify their environment and do the same while working from home which is of utmost importance.

Materials and Methods

This cross-sectional survey was conducted for a duration of six months. Data were collected from IT professionals working from home in Pune city, with a sample size of 150 participants. Participants were recruited using the convenient sampling method. Participants included in the study were IT professionals working from home for at least for three months and using laptop/desktop/smartphone. IT professionals who were pregnant were not included in the study.

The authors developed a questionnaire for this study which was approved by the Ethical Committee of the institute. The questionnaire had different components which covered demographic data of the participants, duration of remote working, frequency of breaks while working, distance of screen from eyes, pattern of sitting, type of chair used, backrest and footrest.

Institutional ethical clearance was obtained before commencing the study. Samples were recruited based on the inclusion and exclusion criteria. The aims and implication of the study were explained in detail to each of the participants prior to recruitment. An informed consent was obtained from each participant prior to the study. Each participant was given the questionnaire to be filled up and then the data were analyzed. The questionnaire was sent to the participants through an online platform such as Instagram, WhatsApp, and Facebook. Consent form was also obtained online. Descriptive statistics were used to report the findings. The characteristics of type of chair, frequency, and duration of break were studied.

Results

Among the 150 participants, 58% were male and 42% were female with the age distribution of 28.4±7.1 years. Average working experience was 5.7±6.4 years. With respect to the duration as participants were working from home, 8.6% reported less than or equal to 3 months, 8.6% of them reported as 4–6 months, 19.34% reported the duration to be between 7 and 9 months, and 63.34% reported it to be greater than or equal to 10 months. On an average, 23.3% of the participants were working for more than 10 h/day, 3.3% were working 7–9 h/day, and the majority (73.3%) were working 4–6 h/day. Majority of the participants (75.3%) used laptop, 22.7% used desktop, and 2% used smartphone for their

work. Figure 1 represents position of participants while working from home: 53% were seated on table, 17% were sitting on bed, 16% were seated on sofa/other, 9% were lying on bed, and 5% were seated on floor and laptop on laptop table.

Figure 2 represents the type of chair used by the participants: 28% used ergonomic chair, 24% used conference chair, 20% used plastic chair, 15% used wooden chair, and 13% used some other kinds of chairs. With respect to the seat, 20% of the participants had hard (wood/plastic) seat on the chair and 80% had soft (pillow/foam/cushion/mesh) seat on their chair. With respect to height of back support, 56% had full back support, 32% had half back support, and 12% had no back support. Majority of the participants (74.7%) used chairs that had armrest/elbow support.

Majority of the participants (92%) took breaks while working: 76% (114) of them took a break once an hour, 9.3% (14) of them took breaks twice an hour, and 6.7% (10) of them took breaks thrice an hour. With regard to duration of break, 4% took a break for more than 16 min, 14.7% took for 11–15 min, 33.3% took for 5–10 min, 40% took for 1–5 min, and 8% did not take break. The manner in which the participants spent their time during the breaks is summarized in Figure 3. In brief, 25% used the break for having a meal/using washroom, 15% used the break to check messages/play games/socialize, 5% watched tele-series/TV during the break, 13% used it to rest, 21% used the time to walk around, 7% to stretch themselves/exercise, 13% engaged in domestic chores, and the remaining did something else.

Discussion

During this global pandemic, it was necessary for the majority of the IT professionals to work from home. As their work requires prolonged hours of sitting to work on desktop/laptop, the IT professionals need to know and apply the principles of ergonomics while working from home to reduce the risk of development of computer-related health problems including MSDs. Most of the participants were unaware about the ergonomics and even if some of them were aware but were not able to implement that in their workstation while working from home. Improper workstation design and incorrect postures are the major risk factors for many musculoskeletal injuries.

In our study, 75% of the total subjects work for 7–9 hours in a day for 6 days in a week without taking frequent breaks and even if they are taking, breaks are not utilized for stretches, walk, etc. to avoid prolonged sitting posture. Extended periods of static sitting postures reduce circulation, which can lead to heart disease, diabetes, and obesity. IT professionals should be encouraged to stand, stretch, and move about during these breaks. It provides relaxation for the muscles and

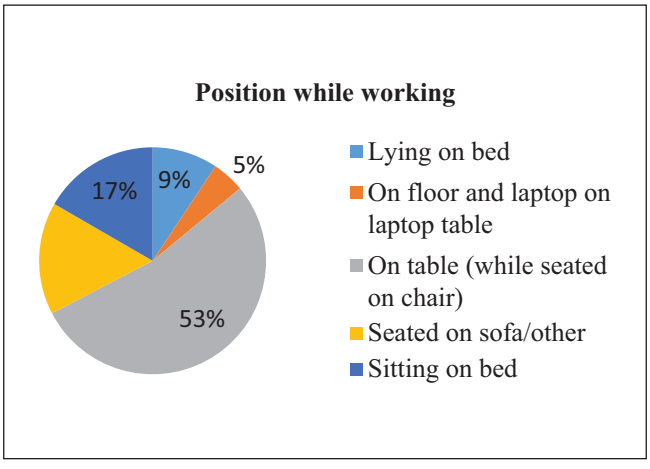

Figure 1: Position adopted by participants while working

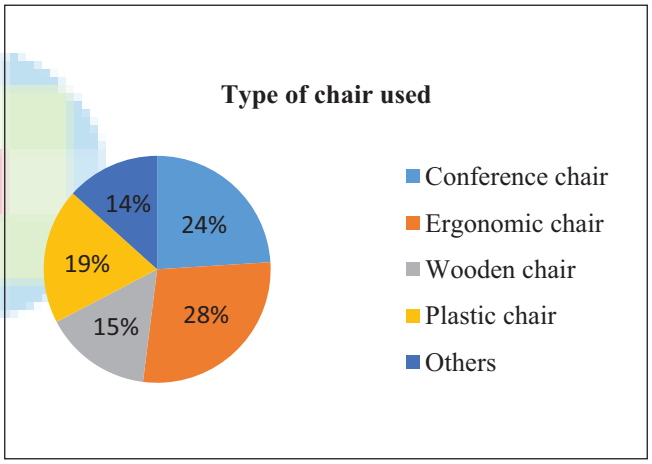

Figure 2: Type of chair used by participants

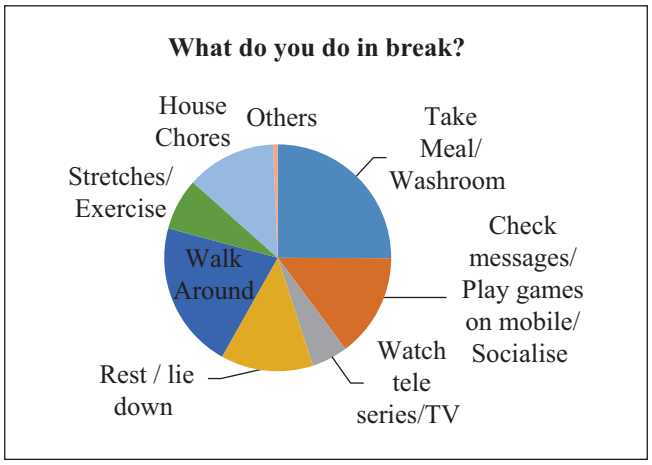

Figure 3: Pictorial representation of various activities done by participants during break

helps them to recover from repetitive strain.[6] Cumulative trauma disorders such as spondylitis and low back pain are the result of prolonged duration of continuous work, which may result in disability, stiffness, fatigue, and pain in the joints among sedentary workers.[7]

This study showed that upper edge of the screen of 40% of the participants was at the level of eyes, of 39.33% of the participants was below the level of eyes, and of 20.67% of the participants was above the level of eyes. Appropriate monitor placement decreases glare and exposure to strenuous exertions and difficult postures, such as the forward head posture. Excessive fatigue, eye strain, and neck and back pain are all reduced as a result of this. The monitor's top should be at or just below the eye level.[7]

The monitor should be positioned at a reasonable distance so that users can text comfortably maintaining an upright posture with their head and trunk supported by the chair. A viewing distance of 20–40 inches (arm's length) from the eye to the front surface of the computer screen is generally regarded ideal.[6]

Most of the participants were unaware of the correct sitting posture at a workplace. Seating should allow worker to move freely in workplace. Visual needs, as well as individual variances among workers, must be met in order to work to be completed successfully. The neck, shoulders, back, and legs will be less fatigued and strained as a result of this. They should try with different positions to find the best fit for them. Working from a seated position necessitates enough space (leg room) to stretch and position the legs in a variety of positions.[8] Working with posture that keeps joints in a neutral, naturally aligned position reduces stress and strain on the muscles, tendons, and skeletal system, lowering the risk of MSD.[9,10] It has been discovered that deviations from neutral shoulder postures (i.e., flexion and abduction) are linked to neck and upper limb complaints.[11-13]

The chair is the base for comfortable computer work. It must be comfortable for the user and appropriate for their tasks. Computer users should be aware of a few key factors while choosing a chair. The user's entire back, including the lumbar region, should be supported by the backrest. The chair's height and tilt should be adjustable to accommodate the lumbar curve.[11] As seen in the study, 12% of the participants did not have back support; this can lead to undue pressure on bony structures and postural discomfort. About 32% of the participants' back was half supported, which means that the cervical region is not supported leading to different cervical and shoulder problems. To avoid slouching, the lower back should be supported. The initial phase should be for people to sit fully in the chair, with their lower back touching the chair's lower section. The next step is to make sure that the low back curve is supported, either by the chair back's curve or by a small pillow or cushion.[6] Only 20% of the participants had seats that were hard (wood/plastic), which might lead to different problems in future. This shows that majority, i.e., 80%, were able to make the required modification. The seat pan should have a softly padded, rounded front edge (waterfall edge). Straight, unpadded edges lead to compression of thigh region and reduce blood circulation, which can cause pain and numbness in the legs.[14]

Keyboard height should allow the user to maintain elbow in 90° flexion.[15] Sauter *et al.* in their study on workstation design and musculoskeletal discomfort found that arm discomfort was associated with keyboard height above the elbow level.[6] About 74.67% of the participants' chair had armrest/elbow support, out of which 54.67% of the participants forearm was always supported while working and 24.67% of the participants forearm was sometime supported. Unsupported arms cause discomfort, which can lead to elevated/rounded shoulders, as well as carpal tunnel syndrome or tendonitis. For support, the user's arm should be near to the body. The mouse should be placed in such a way that it is in same height as that of keyboard and the user may maintain a straight, neutral wrist posture.[16] Injuries due to computer usage 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.[6]

The study showed that 79.33% of the participants' feet were supported. The user should adjust the height of the seat so that the user's knees are at right angles and feet rest flat on the floor or on a stable footrest.[6]

Occupational health and well-being are gaining momentum, and efforts are being made to promote a workplace culture that places a premium on worker health and safety. To detect and solve workplace MSD concerns, they will need solid ergonomic knowledge and abilities. Employees should be taught how to identify ergonomic dangers and how to manage their exposure through ergonomics training.[7] It is the need of the hour to educate and inculcate ergonomic practice among IT professionals to avoid prolong discomfort which leads to different MSDs, cumulative trauma, and other injuries.

With the IT professionals working from home, it is all the more vital to educate them about the ergonomic modification that can be done at their homes using the resources available to them.

Conclusion

In the study, it was found that majority of the participants were unaware about the correct ergonomics and were unable to make modifications in their workstation. Making the changes at a makeshift workstation at home is need of the hour. With the IT Professionals working remotely, it is very important to educate about the ergonomic modification at the remote level.

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Conflicts of interest

The authors declare that there are no financial or other conflicts of interests in the conduct of this work.

Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data are not available.

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