Awareness of ergonomics in Information Technology professionals

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Abstract:

Aim: To find out the awareness of ergonomics in Information Technology professionals

Objectives: To know whether the professionals are aware of optimum positioning of the body while working andimportance of exercises.

Method:Aquestionnaire based survey was conducted among 300 Information Technology professionals.

Results: Descriptive analysis showed majority of the participants were aware about adjustable chair (91%), importance of breaks (93.67%), stretching exercises (89%) and variation in posture (87.3%).

Awareness about correct positioning of the monitor was found to be 57.33% and that about use of slant board while reading was 41.67%. 60% and 52.66% knew about the correct positioning of armrests and frequency of breaks respectively.

Fewer subjects knew the optimum distance to be kept between the eyes and computer screen (19.33%), backrestinclination (34.33%), keyboard inclination (21.33%) and seat height (34.67%).

Conclusion: The study highlighted the need to conduct ergonomic training programs among Information Technology professionals.

Key words: computers, ergonomics, information technology

Period of study: The study was done in the year 2015 and was continued into the early months of 2016

Introduction:

The word ergonomics comes from two Greek words, 'ergon' meaning 'work' and 'nomos', meaning 'laws'.It is a scientific discipline concerned with the understanding of interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.Ergonomics is employed to attain the goals of occupational health, safety and productivity.

Information technology professionals work on computers for prolonged durations. Continuously stating at the screen, repetitive typing and clicking are some of the activities that they do. They may assume various awkward postures as they work.Suparna et al. (2005) has stated that average working hours per day on computer in call center and software development were 9±0.67 h and 8.3±0.81 h, respectively and 5±0.41 h in data entry/processing group.

Walsh et al. (2008) found that musculoskeletal disorders are one of the commonest work-related injuries. Work-related musculoskeletal disorders (WRMDs) result in persistent pain, loss of functional capacity and work disability.

Improper workstation designs force the employees to maintain awkward postures. They may be exposed to compressive forces for long durations. Awkward postures and compression can impede blood flow, impinge nerves and injure soft tissues.

A repetitive strain injury(RSI) is an injury to the musculoskeletal and nervous systems that may be caused by repetitive tasks, forceful exertions, vibrations, mechanical compression, sustained or awkward positions.Deepak Sharan has stated that 15-25% of all computer users worldwide are estimated to have RSI .Over five million Indian computer users(out of an estimated 28 million) may already be having RSI.Proper ergonomic design is essential to prevent repetitive strain injuries and other musculoskeletal disorders, which can develop over time and can lead to long-term disability.

Frequent rest ensures efficient performance of the musculoskeletal system. Timely breaks from work help lower the exposure to the risk of ergonomic injury.

According to a study conducted by Kesavachandranet al. (2006), 81% of the information technology professionals attributed their pain and discomfort to work due to poor seating (49%), constant keying (24%), sitting in the same position for hours (23%) and computer set up (12%).

Hence, assessing knowledge of ergonomics in these professionals is necessary. Much literature is available about this field in the west and few studies have been done in India. The present study was done in an emerging Information Technology hub in India.

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Materials and method:

In the present study, authors aimed at finding out the awareness of ergonomics in Information Technology professionals.The objectives were to know whether the professionals were aware of optimum positioning of the body while working on computers, optimum positioning of computer accessories, importance of frequent breaks and importance of stretching exercises.The study was conducted on 300 Information Technology professionals (213 males, 87 females).Age of the subjects

varied from 21years to 47 years with mean age of 28.17 ±5.06. The study design used waspurposive sampling technique. The inclusion criteria for subjects to be considered for the study were they should be working in the Information Technology industry for at least six months. Subjects who had consulted a physical therapist or an ergonomist to know correct ergonomic practices were excluded from the study. This cross sectional survey was conducted in various Information Technology offices.

Procedure

A questionnaire containing closed ended questions regarding computer ergonomics was formulated and validated by a team of experts in the field.After explaining the purpose of study and assuring about the confidentiality and anonymity of the information so obtained, subjects were asked to fill up the questionnaire along with a written consent. The information so obtained was documented and converted into a computer-based spreadsheet which was utilized for data analysis. Descriptive analysis of the knowledge of the ergonomic components was depicted by percentage of the participants who answered correctly. The study has been approved by the institutional review board.

RESULTS

1. **Awareness about Visual Ergonomics**

Ergonomic component	Awareness
Distance between eyes and computer screen	19.33%
Position of desktop monitor	57.33%
Glare free screen	71.33%
Well lit area	89%
Average:	**59.24%**

2. **Awareness about Spinal Ergonomics**

Ergonomic component	Awareness
Use of slant board while reading documents	41.67%
Adjustable chair	91%
Use of back rest	82.7%
Inclination of back rest	34.33%
Average:	**62.45%**

3. **Awareness about Ergonomics for Upper limb**

Ergonomic component	Awareness
Position of armrests	60%
Inner angle of the elbows	35%
Position of elbows and wrists	43.33%
Type of keyboard	83%

Inclination of the keyboard	21.33%
Position of mouse	63.33%
Average	**50.98%**

4. Awareness about Ergonomics for Lower limb

Ergonomic component	Awareness
Distance between seat pan and back of the knees	31.67%
Seat height	34.67%
Position of feet	85.67%
Average	**50.67%**

5. Awareness about Breaks and Stretching Exercises

Ergonomic component	Awareness
Importance of breaks	93.67%
Frequency of breaks	52.66%
Stretching exercises	89%
Importance of change of posture	87.3%
Average	**80.66%**

DISCUSSION

Awareness about Visual Ergonomics

Average awareness about visual ergonomics was found to be 59.24%.Awareness about correct distance between the eyes and computer screen is considerably low(19.33%).Suparna et al.(2005) reported that 80.2% of the information technology professionals having visual discomfort did not the monitor at correct distance.

Eichenbaum(1996) stated that symptoms related to eyestrain are very common in computer users.Sen and Richardson (2007) found that 64% of computer users experienced eye fatigue and burning sensation. Talwar et al. (2009) found that visual problems were prevalent amongst 76% of computer users. Also, gradual increase in visual problems was observed as number of hours spent working at the computer increased. Adequate lighting in the room and antiglare screens were found to reduce visual problems.Rosenfield (2011) has stated that Computer vision syndrome (CVS) is the combination of eye and vision problems associated with the use of computers. 64% - 90% of computer users experience visual symptoms like eyestrain, headaches, ocular discomfort, dry eye, diplopia and blurred vision after prolonged computer use.

Blehmet al. (2005) stated that proper adjustment of the workstation, proper lighting, anti-glare filters, ergonomic positioning of computer monitor and regular work breaks may help to relieve ocular symptoms.

Awareness about Spinal Ergonomics

Average awareness about spinal ergonomics was found to be 62.45%.Awareness about using slant board while reading documents and inclination of back rest was 41.67% and 34.33% respectively. Sirajudeen etal. (2013) have reported awareness of using slant board while reading documents and to be 48%.

Sharan etal. (2012) found that neck (64.9%) and lower back (56.5%) were majorly affected body regions among Information Technology professionals.Shete et al.(2012)) states that more than 80% people using computers for more than four hours complain of back pain.

Zejda etal. (2009) concluded that seating position could contribute to the frequent occurrence of back pain in computer users.Pope et al. (2002) stated that seated posture leads to an accumulation of metabolites, accelerates disk degeneration and disk herniation. Hence, fixed postures should be avoided and lumbar support should be used.

Sheahanet al.(2016) found that frequent, short standing rest breaks may help reduce symptoms of low back pain, at least temporarily.

Awareness about Ergonomics for Upper limb

Average awareness about ergonomics for upper limb was found to be 50.98%.60% participants knew the correct positing of armrests, while 43.33% knew the correct positioning of elbows and wrists. 21.33% were aware of the correct inclination of key board.Sirajudeen et al. (2013) found that only 25% of the Information Technology professionals were aware about healthy postures related to elbow and 55% knew that wrists and hands should be placed in a straight line.

Shikdar and Al-Kindi (2007) in a study conducted to identify ergonomic deficiencies in computer workstations, found that some of the major problems reported were shoulder pain (45%), arm pain (35%) and wrist pain (30%)·Pascarelliand Hsu(2001) found that in a study population, where 70% of the patients were computer users, hyper laxity of fingers and elbows, carpal tunnel syndrome, radial

tunnel syndrome, cubital tunnel syndrome, shoulder impingement, medial epicondylitis, lateral epicondylitis and peripheral muscle weakness were found in 50%, 8%, 7%, 64%, 13%, 60%, in 33%, and in 70% patients respectively.

Sharan and Ajeesh (2012) reported that one of the major workstation risk factors in IT professionals is keyboard height. Musculoskeletal pain was found to be significantly associated with workstation keyboard/mouse surface and duration of computer use.Zejda et al. (2009) found that pain of wrist/hand could be attributed to forearm support, elbow pain to wrist support, and arm pain to adjustment of the chair. Association was also found between low back pain and chair adjustment and keyboard position.This shows how the ergonomic components are inter- related and may show effects in other body areas.Gerr et al. (2006) stated that resting the arms while working on computer resulted in reduced risk of neck/shoulder symptoms. Minimizing ulnar deviation and keyboard thickness resulted in reduced risk of hand/arm symptoms.

Jenson (2003) concluded that restricting computer use to less than three-fourths of the work time has been found to prevent hand-wrist symptoms.Esmaeilzadeh et al. (2014) showed significantly decreased intensity, duration and frequency of work-related upper extremity musculoskeletal disorders (WUEMSDs) in computer workers. The functional status, physical, and mental health-related quality of life also improved significantly.

Awareness about ergonomics for lower limb

Average awareness about ergonomics for lower limb was found to be 50.67%.

34.67% were aware that the correct seat height is when your buttocks are higher than your knees and feet are slightly forward.This differs from the finding of an in previous survey where(Sirajudeen et al., 2013) found that where more than 79.2% of the participants knew about appropriate height of the seat.

Only 31.67% aware knew the correct distance between seat pan and back of the knees and 85.67% knew that feet should always be supported on a footrest or floor.

Adedoyin et al. (2005) in study among computer users found that knee pain (26%) and foot pain (25%) are the least reported complaints among computer users.

Awareness about breaks and exercises

Average awareness about breaks and stretching exercises was found to be 80.66%.

52.66% were found to be aware of the recommended frequency of breaks.Mohamed Sherif Sirajudeen et al. (2013) found 39% Information technology professionals were aware of mini breaks and 55.2% were aware of micro breaks.

Sharanet al. (2011) stated that social reactivity, inadequate breaks, pressures and deadlines are significantly correlated with pain and loss of productivity.Lis et al. (2007) has stated that sitting for more than half of the working time and assuming awkward postures increases the likelihood of having low back pain.

Juul-Kristensen and Jenson,(2005) concluded that working at the computer during all the work time should be avoided and physical variation with other work tasks while working on the computer should be emphasized. Henninget al. (1997) stated that frequent short breaks from continuous computer work can enhance productivity and well-being.

Van den Heuvel et al. (2003) found that software program stimulated regular breaks to perform physical exercises on work-related neck and upper limb disorders in computer users resulted in recovery from neck and upper limb complaints.

Conclusion:

The study featured awareness regarding various components of computer ergonomics. Majority of the professionals were found to be unaware about correct distance between eyes and the computer screen, inclination of the backrest, inclination of keyboard, recommended seat height and frequency of breaks. As the professionals spend a considerable period working on computers, importance of efficient body positioning and work station design cannot be denied. This can surely enhance productivity and quality of life too. Taking into consideration the rapidly expanding Information Technology industry, there is an immediate need for the concerned agencies to enforce suitable preventive measures.

Clinical implication:

A wise measure would be to conduct ergonomic training programs for freshmen in the Information Technology industry. As computers have made their way into everyone's lives and are being used in vocational as well as avocational activities, including computer ergonomics in school level syllabi could do the needful. Also, it could be made an integral part of computer related professional courses' curricula. Educating individuals consulting in on-site clinics in Information technology industries would be of immense help. Also, software program stimulated, timely reminders for breaks and exercises would help.

Appendix:

Questionnaire

Name:

Age:

Gender:

No. of hours spent daily working on computer:

Working as an IT professional since   years:

Tick marks the most appropriate answer for the following questions:

 While working on a computer,

1. What should be the position of desktop monitor?
    a. Upper border at the eye level or slightly lower
    b. Lower border at the eye level
    c. High up so that you bend your neck backwards to view it
    d. Low down so that you bend your neck forwards to view it
    e. Don't know

2. What should be the distance between your eyes and the computer screen?
    a. 16 to 28 inches

    b. 10 to 15 inches

    c. 30 to 45 inches

    d. 50 to 60 inches

    e. Don't know

3. Is it important to keep the screen glare free?
   a. Yes
   b. No
   c. Don't know

4. Is it important that the area should be well lit?
   a. Yes
   b. No
   c. Don't know

5. Should you use a slant board while reading to avoid excessive bending of your neck?
   a. Yes
   b. No
   c. Don't know

6. Which type of chair should you use?
   a. Adjustable
   b. Non-adjustable/fixed
   c. Don't know

7. How should the armrests be positioned?
   a. Little below the shoulder level
   b. At or just below the elbow level
   c. Considerably below the elbow level
   d. Don't know

8. What should be the inner angle of your elbows?
   a. 30- 40 degrees
   b. 40 -60 degrees
   c. 90 -120 degrees
   d. Don't know

9. What should be the position of your elbows and wrist?
   a. Elbows higher than wrists,supported on arm rests
   b. Elbows lower than wrists, supported on arm rests
   c. Forearms and hands in straight line , unsupported
   d. Supported on arm rests ,forearms and hands in straight line, wrist neutral

10. Is it important to use a backrest?
   a. Yes
   b. No
   c. Don't know

11. What should be the inclination of your backrest?
   a. 105- 120 degrees
   b. 90 degrees
   c. More than 120 degrees
   d. Don't know

12. What type of keyboard should you use?
   a. Adjustable
   b. Non- adjustable
   c. Don't know

13. What should be the inclination of your keyboard?
   a. Flat or slightly negative(sloping towards the screen) inclination
   b. 30 degrees positive(sloping towards the user) inclination
   c. Don't know

14. What should be the position of the mouse?

   a. Lower than the keyboard
   b. Higher than the keyboard
   c. Directly next to the keyboard
   d. Don't know

15. What should be distance between the front edge of your seat pan and back of your knees?
   a. 0 inches
   b. 2-4 inches
   c. 10-12 inches
   d. Don't know

16. Your seat height should be adjusted so that
   a. Your buttocks are higher than your knees and feet are slightly forward
   b. Knees should be higher than buttocks and feet slightly forward
   c. Your buttocks are higher than your knees and feet are slightly backwards
   d. Don't know

17. What should be the position of your feet?
   a. Unsupported
   b. Supported on a footrest or floor
   c. Don't know

18. Is it important to take breaks in between your work?
    a. Yes
    b. No
    c. Don't know

19. How frequently should you take breaks in between your work?
    a. Get up every two hoursfrom your seat and take a short break from key boarding every 1 hour
    b. Get up every four hours from your seat and take a short break from key boarding every 2 hours
    c. Get up every one hour from your seat and take a short break from key boarding every 30 minutes
    d. Don't know

20. Is it important to do stretching exercises in between your work?
    a. Yes
    b. No
    c. Don't know

21. Is it important to change posture frequently?
    a. Yes
    b. No
    c. Don't know

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