

Employees' Familiarity of Computer Ergonomics

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Abstract: The familiarity of computer ergonomics is crucial for the employees since they are working daily with a computer. The study's aim is to describe the familiarity of computer ergonomics among employees. This is a descriptive study of 120 employees selected with a simple random sampling method. The data were gathered using a self-administered form and analysed with SPSS version 23. Most of the respondents are females (51%) and aged 20-30 years old (57%). Majority of the respondents were aware of computer ergonomics (65%) and familiar with the appropriate requirement of ergonomics chair, keyboard, mouse, monitor, workplace environment, and having a regular break after working with a computer, but less percentage on accessories of computer, laptop, and hot desking.

1 INTRODUCTION

The number of injuries connected to long-term computer use is rising rapidly (Editor, 2009). Musculoskeletal disorders (MSDs), computer vision syndrome (CVS), and carpal tunnel syndrome (CTS) are the commonest computer-related injuries (CRIs) among employees (Haskett, 2019). These may lead to sickness absence and disability, decreasing work efficiency, and extensive cost upon the organizations (Sadeghian, 2014).

MSDs are responsible for about 30% of employees' reimbursement costs in the United States. The US companies paid 50 billion dollars on costs of MSDs in 2011 (CDC, 2018). These economic costs are unnecessary because MSDs are preventable. If the employees are aware of what MSDs are and what causes them, how to prevent MSDs, then it may help to reduce the costs and the incidence of injuries. Another problem is computer vision syndrome (CVS), which experienced by almost 60 million people globally that might reduce employees' quality of life. Other studies predict that the occurrence of CVS was about 75 to 90 % among computer users (Ranasinghe, 2016).

Carpal Tunnel Syndrome (CTS) is another disorder among computer users. CTS is a peripheral nerve entrapment syndrome on the adult wrist because of high rates of repetitive movement of the wrists, working with bent wrists, forceful hand motions, and

improper rests of the hands (Dinesh, 2017 and Newington, 2015). It is clinically characterized by pain, tingling, and numbness sensation of hand (Herbert, 2000). The occurrence of CTS was reported by almost 5% among computer users. This syndrome is a major cause of work-time restrictions and economic loss (Jung HY, 2016).

To understand all these, workers must be aware of computer ergonomics. Computer ergonomics is a computer terminal that well-designed ergonomically. This is important for employees who spend hours in front of a computer (Techterm, 2011). Computer ergonomics provide clues on how to select the proper equipment and sit with a good posture, hence when the principles are implemented and practiced by employees, it will reduce the incidence of MSDs, CVS, and CTS. An interventional study by Mary et al. in New Jersey, US, reported that ergonomic intervention that involves providing ergonomic equipment and training on workstation ergonomics reduced the occurrence of MSDs by an average of 40% (Mary et al., 2001). Hence, it is crucial that all workers get appropriate training on ergonomics and having adequate familiarity with computer ergonomics. Therefore, this study's aim was to figure out the familiarity of computer ergonomics among employees in one private university in Jakarta, Indonesia.

2 LITERATURE REVIEW

Kroemer stated that “*ergonomics is the application of scientific principles, methods, and data draws from a variety of disciplines to the development of engineering systems in which people play a significant role*” (Kroemer, 2000).

The International Ergonomics Association Executive Council (IEAEC) defined ergonomics as follows:

“Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the 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” (IEAEC, 2000).

Occupational Safety and Health Administration defined ergonomics as:

“Ergonomics is the science of adapting workstations, tools, equipment, and job techniques to be compatible with human anatomy and physiology to reduce the risk of musculoskeletal disorder injuries due to ergonomic stressors” (OSHA, 2018).

In the United States, ergonomics is known as Human Factors (Swain & Guttman, 1983). The goal of ergonomics or human factors is to create comfortable workstations for employees and reduce the incidence of MSDs or other related injuries (Alan, 2013). Some other benefits are a reduction in worker's compensation cost, improved productivity, protecting human resources, reduced turnover, and reduced absenteeism (Mc Murray, 2014). Another study reported that ergonomic training successfully reduced employees' medical claims (Mc Murray, 2014).

Computer ergonomics comprises selecting certain tables and chairs that suitable for a worker's body size and providing ergonomic keyboards and wrist rests. All this computer equipment need to have an ergonomic design. A chair with ergonomic design may support the back and avoid symptoms of MSDs. Neck pain could be prevented by adjusting the monitor to the appropriate height. Carpal tunnel syndrome (CTS) could be prevented by using a wrist rest while using a mouse or keyboard. (Mc Murray, 2014).

The height of the table should be adjusted for every employee. Hence the employee may sit up straight and see the monitor at the correct level. When these types of ergonomic equipment are utilized together, it will create an ergonomic workstation or computer terminal. This is crucial since most of the

time, they work in front of a computer. Therefore, by giving attention to this principle of ergonomics, employees may avoid the occurrence of CRIs in the future (Techterm, 2011).

The familiarity of workplace ergonomics is the ability to know and perceive or knowledgeable about the well-designed and comfortable workplace for the employees. This familiarity is crucial for every employee because the unergonomic workplace may cause injuries (Jomoah, 2014). These injuries do not occur overnight. Computer ergonomic may help to avoid the occurrence of CRIs. The employers need to be aware of this issue by choosing proper desks and chairs for their employees. On the other hand, practicing better posture and good working habits are essential for every worker. This habit can be ingrained if the workers are familiar with computer ergonomics (Brace, 2005).

MSDs are injuries of soft-tissue of muscles, nerves, tendons, ligaments, joints, that result from continuous and prolonged exposure. This type of injury is called CRIs (Sinkwitz, 2014). The neck, back, shoulder, and arm pain, headaches, eyestrain are common CRIs among computer users. Some muscle and joint problems will get injuries because of inadequate workstations and inappropriate posture. Moreover, employees need to maintain some parts of the body static for hours in the office. This condition may reduce the circulation of blood to the organs, and it may lead to stiffness and pain of muscles, tendons, or ligaments. These static positions can produce greater damage to the muscles and joints (Government, 2018).

Moreover, CVS occurred because the employees focus their eyes on the monitor for a long period. The American Optometric Association (AOA) defines CVS as a “complex of eye and vision problems related to the activities which stress the near vision and which are experienced in relation, or during, the use of the computer” (AOA, 2008). The most common complaints reported are eyestrain, irritation, burning sensation, redness, blurred vision, and double vision. These symptoms may disappear after work, but some employees may get a prolonged symptom after work (Loh, 2008).

There are two factors that affect to the occurrence of CVS, first is personal factors, such as poor sitting position, wrong viewing distance angle, eye diseases, and aging; second is environment and computer factors, such as poor lighting, imbalance of light between the monitor and the office, poor resolution and contrast, and glare of the monitor (Assefa, 2017). The human eyes favor looking at objects more than six meters. Hence any works performed close up

cause burdens to the eye muscles. The illuminated computer monitor may cause eye fatigue. Hence computer users may get CVC symptoms. (Government, 2018).

Furthermore, the increasing use of laptops has caused more injuries, pains, and eyestrains among computer users. Actually, a laptop was designed for short time usage of the computer when someone could not access a desktop. The monitor and keyboard of a laptop are very close that may cause the user to lift their arms and shoulders too high. The laptop users also need to hunch their shoulders and neck, and these positions will cause neck and shoulder pain (Government, 2018).

Some organizations have implemented office ergonomics assessments to reduce and prevent of CRIs among employees and also conducting ergonomic training. Integrating the principles of ergonomics and counseling can achieve healthier employees and improve productivity and lower costs (Moore and Lopes, 1999).

3 METHODS

A descriptive quantitative study was used in this research. The study was conducted among 120 computer users at Universitas Mercu Buana (UMB), Jakarta, from January-February 2019. The inclusion criteria of the participant were computer users that have been using the computer for their daily tasks for about one year and with a minimum of 5 hours working with a computer daily in the office. The exclusion criteria were office workers who are having musculoskeletal complaints because of acute trauma in the last 30 days or systemic diseases such as gout, hyperlipidemia, or eye diseases such as conjunctivitis.

The data was collected by using a validated self-administered questionnaire that consists of questions on socio-demographic data; 16 questions on awareness of workstation ergonomics by using the Workstation Ergonomics Self-Assessment (Queensland Government, 2013). The content and face validity were done by the researchers, and the construct validity was done by using Pearson's Bivariate analysis. A pilot study was carried out by distributing a questionnaire to 30 non-sample participants, with Cronbach's alpha 0.700.

The familiarity score was obtained by giving score 'one' for each correct answer and 'zero' for the wrong answer based on participants' responses to questions from the questionnaire. The maximum score was 16 and minimum score was 3 (mean

score=9.6±2.6; median= 10, mode = 11). Furthermore, the familiarity of workstation ergonomics was categorized into two categories, 'aware' if the score obtained was more than mean score (≥ 9), and 'unaware' if the score obtained was less than mean score (< 9).

4 RESULTS

The result showed that the majority of participants are women (50.8%), aged 20-30 years old (56.7%), and never attended any ergonomics training (87.5%). The assessment of workstation ergonomics was displayed in Table 1. Based on the assessment, most of the participants were aware of workstation ergonomics (65%).

5 DISCUSSION

The majority of the participants were familiar with computer ergonomics (65%). However, they had a low percentage on some questions, such as questions on accessories, laptop, and hotdesking (Table 1).

Regarding computer accessories, only 16.7% of participants that was having a small inclined board to assist them in reading or writing. More than half of the participants did not have a document holder (53%), and fewer participants use a headphone when they were writing and at the same time, having a conversation on the phone (22.5%). Moreover, many of them did not use a full-sized external keyboard and mouse while using the laptop for prolonged periods (67.5%), and the majority did not get hotdesking (89,2%).

This situation remains a concern because if it is managed carefully will cause future injuries for the employees. The use of laptops in the office should be avoided, because working in the office about 8 hours relatively long period and may cause injuries, such as neck and shoulder pain. Laptops should be used only for a short time. Moreover, the university should provide a document holder for each employee, since most of them work with writing and viewing documents. Hot desking should be conducted to supervise workers so that computer-related injuries can be avoided.

Habibi (2016) and Husein (2009) suggested an ergonomic intervention such as workplace redesign, educate the users about ergonomic principles of computers and reduce working with computers to prevent injuries (Habibi, 2016; Husein, 2009). An

ergonomics chair may also prevent computer-related injuries and reduce body pain (Pardede, 2013).

6 CONCLUSIONS

Most of the employees at UMB were familiar with computer ergonomics, but at some issues should be corrected to increase the level of familiarity and to avoid the computer-related injuries. Ergonomics training is highly recommended for all employees at UMB.

7 SUGGESTIONS

This study is useful as additional literature for ergonomics research among computer users in Indonesia. Future research regarding ergonomics can be carried out in other institutions, for example, such as experimental study with observation or monitoring the employees while they are working with computer in their offices from 8 am to 5 pm using closed-circuit television (CCTV) to figure out whether they work according to the ergonomics principles or not.

7.1 Limitation of the Study

The study was only conducted in one university.

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Table 1. Assessment on Workstation Ergonomics

Questions	Yes Frequency (%) (n=120)	No Frequency (%) (n= 120)
Chair		
1. Can the height, seat, and back of the chair be adjusted to achieve the posture outlined below?	78 (65.0)	42 (35.0)
2. Does your chair provide support for your lower back?	88 (73.3)	32 (26.7)
3. When your back is supported, you able to sit without feeling pressure from the chair seat on the back of your knees?	76 (63.3)	44 (36.7)
4. Do your armrests allow you to get close to your workstation?	87 (72.5)	33 (27.5)
Keyboard and Mouse		
1. Are frequently used items within easy reach?	105 (87.5)	15 (12.5)
2. When using your keyboard and mouse, are your wrists straight and your upper arms relaxed?	87 (72.5)	33 (27.5)
3. Is the mouse comfortable to use?	103 (85.8)	17 (14.2)
Workstation environment and monitor		
1. Is your monitor and work surface free from glare?	87 (72.5)	33 (27.5)
2. Do you have appropriate light for reading or writing documents?	117 (97.5)	3 (2.5)
Break		
1. Do you take postural breaks every 30 minutes? E.g., standing, walking to printer/facsimile, etc.?	83 (69.2)	37 (30.8)
2. Do you take regular eye breaks from looking at your monitor?	85 (70.8)	35 (29.2)
Accessories		
1. Is there a sloped desk surface or angle board for reading and writing tasks if required?	20 (16.7)	100 (83.3)
2. Is there a document holder either beside the screen or between the screen and keyboard if required?	56 (46.7)	64 (53.3)
3. Are you using a headset or speakerphone if you are writing or keying while talking on the phone?	27 (22.5)	93 (77.5)
Laptop		
In the event of using a laptop computer for prolonged periods of time, use of a full-sized external keyboard and mouse.	39 (32.5)	81 (67.5)
Hot Desking		
Provided time, support, and supervision to make the above adjustments.	13 (10.8)	107 (89.2)