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The Effect of Prolonged Computer Usage with Perceived Neck Pain Among Women Employee in Various Workstation Setup

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Abstract

Computer use is common among workers around the world but prolonged use of a computer can cause neck problems. Therefore, an exploratory study is needed to investigate the problem of neck pain among computer workers. The aim of this study was to determine the effect of time spent in computer work under three condition of screen placement that can contribute to neck pain among women employees. A total of eight selected participants of women employee were involved in the data collection. In this experiment, perceived neck pain rating and neck cervical flexion angle measurement were taken periodically throughout the 40 minutes of typing task in three kinds of workstation setups. This experiment observed the pattern of changes in perceived neck pain and cervical flexion angle over time and on extrapolation model can predict the severity of neck pain at longer intervals. The result from the experiment affirmed that monitor screen placed in front setup has significantly given less severity compared with others setup and the screen placed to the side setup showed the worse effect and gave the highest severity on the neck pain. In general, these findings as per extrapolation models may give an insight into the organization to take action in proper job scheduling, especially in computer working duration, and workstation arrangement, to reduce the incidence of unwanted injuries.

Key Words: neck pain; computer work; time duration; cervical flexion angle; extrapolation model

1.0 INTRODUCTION

Computers are common tools that facilitate and make works more efficient for many employees in the workplace. The advancement of technology has promoted higher usage of computer in daily lives, especially for education and work purposes since over four decades ago. The utilization of computer has become an essential means in the industry in various countries around the world, such as Japan, Kuwait, Taiwan, Australia, United States, Nepal and Greece (Babski-Reeves, Stanfield, & Hughes, 2005; Fereig, Qaddumi, & El-Akkad, 1989; Fogleman & Lewis, 2002; Hou, 2012; Shrestha, Mohamed, & Shaha, 2011; Vlahos & Ferratt, 1995; Yoshitani, 1980; Zeffane & Cheek, 1993). According to 2020 vision stated, Malaysia will become a country fully equipped with high-end technology (Faryza, Murad, & Anwar, 2015). This has been proven, the Malaysian ICT industry registered a growth of 14.2% to RM70.9 billion in 2015 compared with RM62.1 billion or 12.5% growth in 2014 (Awani, 2015). This rapid development era demanded employees to use computers intensively (Evans & Patterson, 2000) to help the organizations in raising work quality, productivity and efficiency (Culpan, 1995) and use for data entry, data storage, designing and

information search (Faryza et al., 2015). In a manufacturing operation, computers were applied in all aspects which include planning, control, scheduling, designing, distribution, processing, marketing, and production to meet the high demand of product (Shaheem, Idris, Alazrq, Alheblow, & Aziz, 2015). Nevertheless, it was reported to cause an adverse effect regarding health and safety of the workers (Evans & Patterson, 2000; Faryza et al., 2015; Skilling, Weaver, Kato, Ford, & Dussia, 2005).

Computer users are acknowledged to be exposed to neck-shoulder symptoms which were mainly caused by repetitive and continuous work (Ming, Närhi, & Siivola, 2004). An individual who experiences neck pain has a limited range of motion (ROM) and a subjective feeling of stiffness. The symptoms worsen with sustained neck postures and neck movement (Hoving et al., 2002). This occurrence may affect a large number of computer workers and subsequently may bring a socio-economic impact (Evans, Bronfort, Nelson, & Goldsmith, 2002) due to higher usage on medical consultation and sick leave (Ylinen, Salo, Nykänen, Kautiainen, & Häkkinen, 2004). Many researchers have reported that the incidence of neck pain occurred among office workers in the various countries including Atlanta, Sweden and Finland (Gerr et al., 2002; Korhonen et al., 2003; Wahlström, Hagberg, Toomingas, & Wigaeus Tornqvist, 2004). Statistics on neck pain in Malaysia showed the annual years of healthy life lost per 100000 people from neck pain in Malaysia has increased by 16.3% since 1990, an average of 0.7% a year (Graphiq, 2016). It also was contributed high percentage after lower back pain in a study of WMSDs among office workers (Abdullah, Othman, & Justine, 2016; Balakrishnan, Chellappan, & Changalai, 2016; Faryza et al., 2015) and also indicate the highest prevalence to intensive computer users in Malaysia (Zainon@Md.Ali & Dawal, 2008). However, many cases have not been reported because of lack of awareness and understanding on ergonomics (Mohd Yusuff, Baba, Siti, & Tan, 2016).

There are several risk factors which caused the neck pain among the computer users. The computer users who worked with time pressure and high quantitative job demand frequently experienced neck pain (Strøm, Røe, & Knardahl, 2009). Prolonged use of computer demands a static posture of the upper limbs. The longer times spent sitting and keying during computer work were significantly correlated with neck pain (Mahmud, Bahari, & Zainudin, 2014). Therefore, designing the time schedule and workstation for every worker needs to be done for worker's comfortability. Hence, it is imperative for researchers to focus on studying this phenomenon as the occurrence of neck pain has become a vital issue, especially for women workforce. The aim of this study was to determine the effect of time spent in computer work under three condition of screen placement that can contribute to neck pain among women employees. It was hypothesized that neck pain would significantly increase as the duration of computer usage is getting longer and the less the angle made against head flexion and twisting due to muscle strain and there are differences in effects to any workstation for that variables.

1.1 Computer-Related Injuries

Work-Related Musculoskeletal Disorders (WMSDs) among office worker with intensive computer use is widespread, and the prevalence of symptoms is growing. Survey has reported 70% to 75% from the computer user among employees have health problems, which mostly includes the symptoms of eyestrain, headaches, neck pain and blurred vision (Foye et al., 2002). Repetitive tasks performed by certain input and output peripherals, and incorrectly utilized work surfaces and chairs, generate the causes for computer related WMSDs (Lale, 2013). The growth of reliance on computer usage is proportionate with the medical consultation taken by employees (Skilling et al., 2005).

Neck pain is defined as pain experienced from the base of the skull (occiput) to the upper part of the back and extending laterally to the outer and superior bounds of the shoulder blade (scapula)(Green, 2008). The neck has a lot of movement and to support the weight of the head. Since it is less protected than the rest of the spine, the neck can be at a higher risk to injury and disorders that produce pain and restrict motion. Supporting this statement, researchers has stated the higher prevalence of discomfort due to intensive computer usage in the neck-shoulder region, compared to other areas (Balakrishnan et al., 2016; Straker et al., 2008). Computer users are stated to be at higher risk of catching neck-shoulder symptoms (Ming et al., 2004) than those who works at low-exposure of office and industrial tasks (Johnston, Souvlis, Jimmieson, & Jull, 2008). Neck pain frequently occurs during work involving very low levels of muscle activity, such as office work with computers (Strøm et al., 2009). This incidence was mainly caused by working with computer in a repetitive manner and/or continuously (Ming et al., 2004). However, typing and writing during computer work require less head flexion. This phenomenon is due to the increase in flexor moment caused by the mass of the head, and the head and neck, about axes of rotation at the level of atlantooccipital joint and the cervical spine. Consequently, the musculature has to produce higher tension for maintaining the static equilibrium (Burgess-Limerick, Plooy, & Ankrum, 1998). The neck pain related to computer use is usually work-related and chronic.

Working for an extended period will require a static posture of the upper body, which will overload the muscles of the neck, shoulder and upper limbs, which consequently, leads to injuries. Poor postures because of lacking conditioning of workstation will shorten the soft tissues and may cause tension, weakness, and fatigue to the muscle (Ming et al., 2004). Poor positioning of monitor screen also may cause eye strain that will increase the tendency for the head to lean forward (Keller, Corbett, & Nichols, 1998). This awkward posture will cause soreness at the neck region (Yan, Hu, Chen, & Lu, 2008). Computer users commonly complain of pain in the upper trapezius or levator scapular muscles. Previous research has shown a positive relationship between activation of the upper trapezius muscle and flexion of the cervical spine muscles during computer operation (McLean, 2005; Won-Gyu, 2014). Increased forward head movement, specifically combined with lower cervical flexion and upper cervical extension, might result in tightness of the cervical extensors as well as increased compressive forces in the articulations of the cervical spine (Moore, 2004) and

cervical flexion angle of the group with upper trapezius pain decreased more after computer work (Won-Gyu, 2014).

The requirement of higher productivity demands the workers to use computers for longer periods daily that bring transformations in an organization. Hence, the workers are obliged to adjust with these changes physically and mentally. It is commonly established that the aetiology of neck disorders is complex which is related with groups of risk factors (Cagnie, Danneels, Van Tiggelen, De Loose, & Cambier, 2007; Ranasinghe et al., 2011).

1.2 Relationship between Time Duration and Neck Pain

Prolonged use of a computer to do a task such as typing and designing were frequently associated with the incidence of neck pain (Babski-Reeves et al., 2005; Szeto, Chan, Chan, Lai, & Lau, 2014). Prolonged static posture can be caused by sustained muscle contraction that can produce lactic acid resulting from an insufficient oxygen supply to the muscles. As a result, neck muscles will experience fatigue and pain.

The functional disorder of the neck usually is related to pain and muscular fatigue (Barbara Cagnie, Cools, De Loose, Cambier, & Danneels, 2007). The risk of neck disorders increases among those who have high work strain, intensive mouse, and keyboard use, perceived high muscle tension and previous neck symptoms, where using in a long period (Mahmud et al., 2014). It is commonly acknowledged that disorder exists in the musculature function in the presence of pain due to reflex inhibition. It has been reported that acclimating an awkward posture of the neck in a particular angle and a given period are the most important factors contributing to neck pain among office workers (Nejati, Lotfian, Moezy, & Nejati, 2014). It has been shown that office workers have the high tendency to increase their forward neck flexion when performing a computer task, compared to their relaxed sitting postures (Szeto, Straker, & O'Sullivan, 2005) and filled more pain on the neck for those seated in a bad posture with the head in a flexed forward position in a certain period of time (Mohammed Younus, M and Rosnah, 2013). This occurrence was more frequent in the symptomatic group (Yang & Cho, 2012). Neck and head flexion also may occur during the keying task. Additionally, neck and shoulder symptoms, whose sufferers were observed to mainly compose of females, were seen to be associated with working for more than 10 hours per day, laboring for more than two years for a hi-tech company, and using uncomfortable workstations (Lale, 2013). Lower display heights also will cause more head and neck flexion with more asymmetrical spine when working on the computer in a certain duration of time (Mohammed Younus, M and Rosnah, 2013).

A sustained period of neck flexion was cited to have a significant relationship with the incidence of musculoskeletal injury (Kilbom & Persson, 1987). Reported that 65% of the respondents, who have worked for 28.3 hours per week on the computer, have had neck or shoulder pain during the past month (Evans & Patterson, 2000). This phenomenon is due to the increase in flexor moment caused by the mass of the head, and the head and neck, about axes of rotation at the level of atlantooccipital joint and the cervical spine. Consequently, the

musculature has to produce higher tension for maintaining the static equilibrium (Burgess-Limerick, Mon-Williams, & Coppard, 2000; Burgess-Limerick et al., 1998). Range of motion (ROM) assessment is scientifically established in the clinical process of diagnosis, prognosis and outcome evaluation in neck pain (Ernst et al., 2015) with measurement of cervical flexion angle that has been shown to decline in the use of computers for a certain period of time (Park & Yoo, 2014; Won-Gyu, 2014).

2.0 METHODOLOGY

An experiment was performed to assess the effect of duration of computer usage on perceived neck pain in three kinds of workstation setup. Eight female workers were recruited from the clerical staff at Polytechnics of Sultan Haji Ahmad Shah, Kuantan Pahang, to participate in the experiment in the age range of 28-43 years old (mean = 36 years old, SD= 5.398). All participants were free from serious neck muscle illness and had not undergone any treatment in previous 12 months. These selection criteria are important to obtain a good agreement of validity of the research findings. This experiment requires the subjects to perform computer work in three different setups i.e., 1) a monitor placed in front of the subjects (First Workstation), 2) the monitor is positioned 30° to the side of the subjects (Second Workstation), and, 3) a subject using a laptop (Third Workstation). These setups were chosen due to most workers are still using this setup in their computer work

Before the experiment, the subjects were asked to adjust any component workstation according to the research objectives. Establishment of workstations remained unchanged throughout the experiment for 40 minutes. To do the experiment for the next workstation setup, the subjects must rest for at least four to five days to make sure there are no symptoms of pain occur. During the experiment, for every setup of the workstation, the maximum cervical flexion angle was measured, and perceived neck pain rating was collected. Maximum cervical flexion angle was measured by using Goniometer (Figure 1) and, the perceived neck pain was rating based on 10-point Borg scale (0: No pain at all; 10: Extremely strong pain) inside the questionnaire given. The subjects were asked to engage in a typing task which only involved keyboard as the input device. The subjects performed the typing task for 10 minutes before data was collected. The participants were instructed to perform 40-minute typing task in order to obtain the trend of any changes in both measurements. Table 1 showed the summarized of the control parameter setting for all workstation setup for this experiment. The data collected from the experiments was analysed using the IBM Statistical Package for Social Sciences (SPSS) version 20. All analyses were performed with the significant level at $p<0.1$ and $p<0.05$ (90% and 95% confident level).

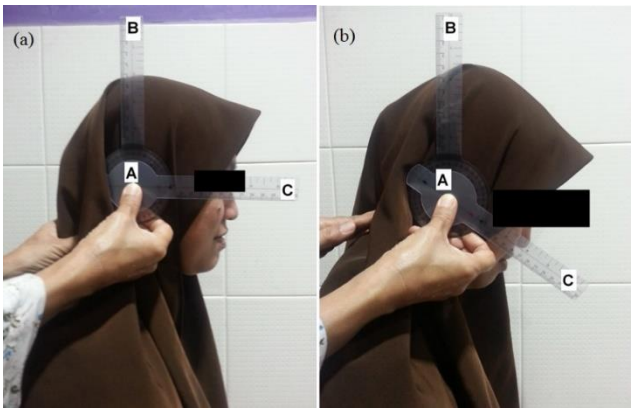

Figure 1: The technique of Cervical Flexion Angle Measurement. (a) Before. (b) After

Table 1: Control Parameter Setting of Experiment

Parameters	First workstation	Second Workstation	Third Workstation
Work Surface Height	72 cm	72 cm	72 cm
Back Rest Width	32 cm	32 cm	32 cm
Seat Pan Width	40 cm	40 cm	40 cm
Seat Height	Adjustable	Adjustable	Adjustable
Seat Pan Depth	40 cm	40 cm	40 cm
Arm Rest	-	-	-
Leg clearance	Good (Adjustable)	Good (Adjustable)	Good (Adjustable)
Leg clearance depth	Good	Good	Good
Thigh Clearance	Good (Adjustable)	Good (Adjustable)	Good (Adjustable)
Screen Monitor Distance	Arm length	Arm length	Arm length
Vision angle	-	-	20°
Monitor position to the side	-	30°	-
Monitor tilt angle	15°	15°	15°
Monitor size	17"	17"	15"

3.0 RESULTS AND DISCUSSION

3.1 Neck Cervical Flexion Angle Measurement and Perceived Neck Pain Score

Tables 2 provides the mean cervical flexion angle measurements and perceived neck pain score by the subjects at each time point of the experiment for each workstation setup respectively. Generally, Tables 2 shows that neck cervical flexion angle decreased after 40

minutes of typing. In contrast, the rating of perceived neck pain increased after 40 minutes of typing. For first workstation setup (monitor placing in front), the neck cervical flexion angle decreased as much as 29.45% and perceived neck pain increased as much as 95.66% after performed 40 minutes typing task with Pearson correlation r = -0.935, p = 0.000. For second workstation setup (monitor placing at the side), showing the effects are worse compared with first workstation setup. Cervical flexion angle decreased as much as 70.62% and perceived neck pain increased as much as 126.78% with Pearson correlation r = -0.977, p = 0.000. However, for the third workstation setup (using a laptop), there were no significant differences with the first setup. There is only a little difference where cervical flexion angle decreased as much as 34.56% and perceived neck pain increased as much as 103.26% with Pearson correlation r = -0.923, p = 0.000. It can be concluded that the perceived neck pain has a strong negative correlation with cervical flexion angle for all workstation setup and the second workstation gave worse effect and high severity on neck pain compared with others workstation setup. A summary of these measurements is illustrated in a graph as shown in Figures 2 and 3.

Table 2: Neck cervical flexion angle measurements and perceived neck pain score at different time point of experiment

Work station	Time Spent on Computer	Flexion Angle (°)		Perceived Neck Pain Rating	
		Mean	Total % Reduction	Mean	Total % Increment
First Workstation	Before	39.00	-	1.13	-
	10 mins	36.54	6.73%	1.52	25.82%
	20 mins	34.54	5.79%	2.02	24.79%
	30 mins	31.13	10.98%	2.79	27.76%
	40 mins	29.38	5.96%	3.38	17.28%
Second Workstation	Before	38.08	-	1.13	-
	10 mins	34.79	9.46%	1.81	37.70%
	20 mins	31.88	9.15%	2.71	33.08%
	30 mins	25.79	23.59%	4.04	32.99%
	40 mins	20.08	28.42%	5.25	23.02%
Third Workstation	Before	39.33	-	1.12	-
	10 mins	36.29	8.38%	1.53	26.90%
	20 mins	34.25	5.96%	2.16	29.09%
	30 mins	30.92	10.78%	2.85	24.23%
	40 mins	28.25	9.44%	3.71	23.03%

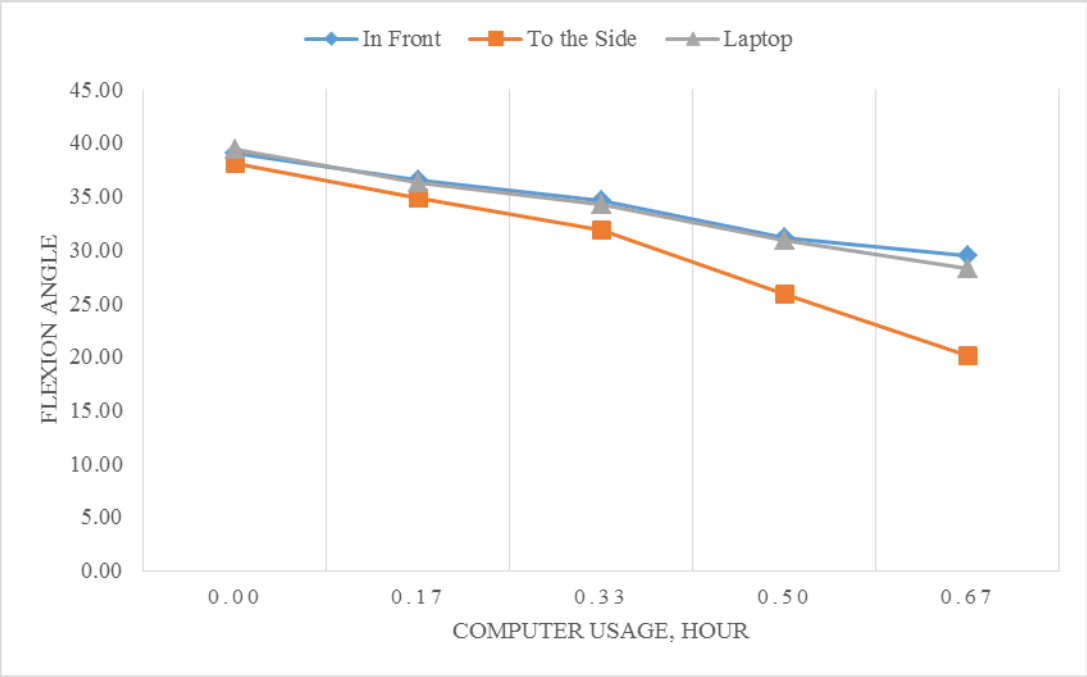

Figure 2: Graph of Cervical Flexion Angle, comparison by monitor position

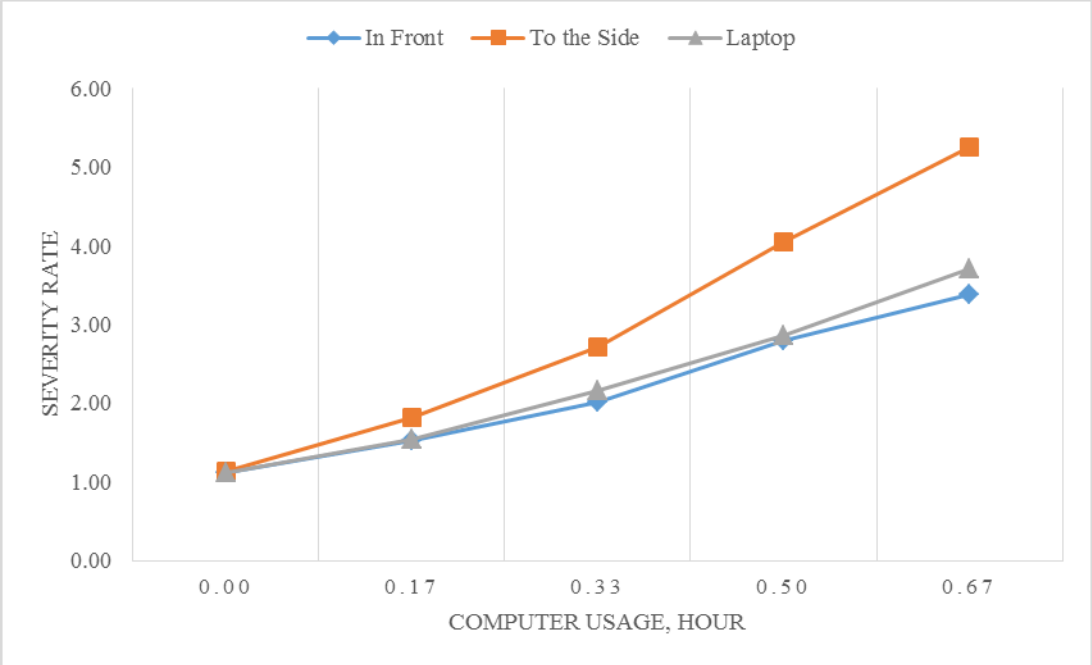

Figure 3: Graph of perceived neck pain, comparison by monitor position

3.2 Relationship between Cervical Flexion Angle, Perceived Neck Pain and Duration of Computer Task in Different Workstation Setup

In the repeated measures, ANOVA analysis, the results showed that the mean Cervical Flexion Angle and the score of self-rated neck pain had a significant difference between time points ($p < 0.05$) for all workstation. This can be concluded that prolong used the computer will affect the severity of neck pain and reduced the cervical flexion angle for all workstation setup. The results of the post-hoc analysis of the pairwise comparison

between each time point with the starting point of the experiment for cervical flexion angle and perceived neck pain are summarized in Tables 3.

Table 3: The post-hoc analysis

Dependent Variable	Time point (minutes)	First Workstation		Second Workstation		Third Workstation	
		Mean Difference	p	Mean Difference	p	Mean Difference	p
Cervical Flexion Angle	10	2.460	0.918	3.291	0.868	3.043	0.843
	20	4.459	0.562	6.209	0.377	5.084	0.441
	30	7.875	0.079	12.2925*	0.008*	8.416	0.055
	40	9.6250*	0.019*	18.0025*	0.000*	11.0838*	0.006*
Perceived Neck Pain Rate	10	-0.391	0.980	-0.685	0.887	-0.414	0.971
	20	-0.893	0.702	-1.579	0.234	-1.044	0.529
	30	-1.666	0.140	-2.9125*	0.003*	-1.733	0.093
	40	-2.2500*	0.021*	-4.1200*	0.000*	-2.5875*	0.004*

As shown, for the first and third workstation setups, cervical flexion angle elicited a slight reduction from prior to typing task to 10 minutes, 20 minutes and 30 minutes of typing; this is not statistically significant ($p \geq 0.05$). However, the cervical flexion angle reduced after 40 minutes of typing, a significant difference when compared to prior of typing task ($p < 0.05$). Perceived neck pain has a small increment from prior to 10 minutes, 20 minutes and 30 minutes of typing, which was not statistically significant ($p \geq 0.05$) for both workstation setups. Similar with cervical flexion angle, the self-rated neck pain increased significantly after 40 minutes of typing ($p < 0.05$) and increases further following continuous typing. Hence, we conclude that 40 minutes of typing is the least duration that could elicit a statistically significant reduction in cervical flexion angle and increment in perceived neck pain for these workstation setups.

For second workstation setup, shown a cervical flexion angle, has a non-significant reduction ($p \geq 0.05$) from the beginning of the experiment to 10 minutes and 20 minutes of typing. Nevertheless, the cervical flexion angle decreased after 30 minutes of typing; this was significantly different than prior of typing task ($p < 0.05$). On the other hand, perceived neck pain rating also has a small increment from prior to 20 minutes of typing, which was not

statistically significant ($p \geq 0.05$). Similar the measurements of cervical flexion angle, the self-rated neck pain increased significantly after 30 minutes of typing ($p < 0.05$) and increases further following continuous typing. Conclusively, we conclude that 30 minutes of typing is the least duration that could elicit a statistically significant reduction in cervical flexion angle and increment in perceived neck pain for this workstation setup.

In this present study, it was shown that the second workstation setup which is placing the monitor at the side from the respondents indicate more serious consequences than any other setup because it affects more rapidly in the 30th minutes, compared with another setup that becomes worse only after 40 minutes in the typing task. These findings were supported by literature which has shown that poor positioning of computer devices may cause the worker to be in awkward static posture (Johnston et al., 2008). Others researcher explained that improper keyboards and monitors position were significantly associated with eye and back, and shoulder and head discomforts, respectively (Lale, 2013). Pain also can occur due to prolonged cervical rotation, caused by the position of the monitor that is not placed in front of the employee (Foye et al., 2002). Working on dual-screen where the second screen was placing 15° to the side, also contribute the changing of muscle activity compare with working in single screen due to involving in head twisting (Szeto et al., 2014) and it also associated with increased activity of the trapezius muscle (Tamrin, Akir, Guan, How, & Zolkifli, 2016).

Overall in this study for all workstation setup, neck cervical flexion angle has decreased significantly after using the computer for 40 minutes which has a strong inverse correlation with perceived neck pain. These findings were supported by previous research which has shown that people who work with a computer for a longer time tend to sport an awkward posture in order to look at monitor screen (Szeto, Straker, & Raine, 2002).

3.3 Prediction of Perceived Neck Pain by Extrapolation

In this study, an extrapolation analysis was used in analysing the data generally to estimate the perceived neck pain after a period of time of computer usage for each workstation setup. A quadratic extrapolation analysis was used as it showed the best-fit characteristic to the data points ($r^2 \rightarrow 1$). Although extrapolation analyses tend to have greater uncertainty, it is still able to present a forecasted pattern of the level of perceived neck pain. Figures 4 - 6 illustrates the results of the extrapolation analysis showing the forecasted perceived neck pain after 1-hour computer work for three difference workstations setup.

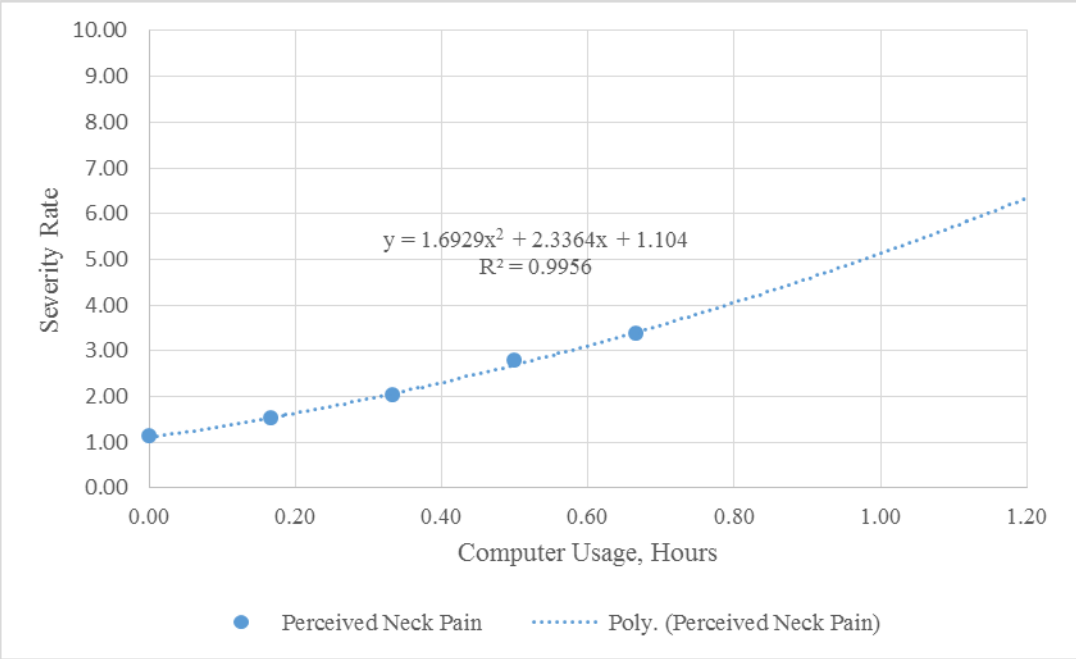

Figure 4: The change in perceived neck pain with duration of computer usage (monitor placing in front)

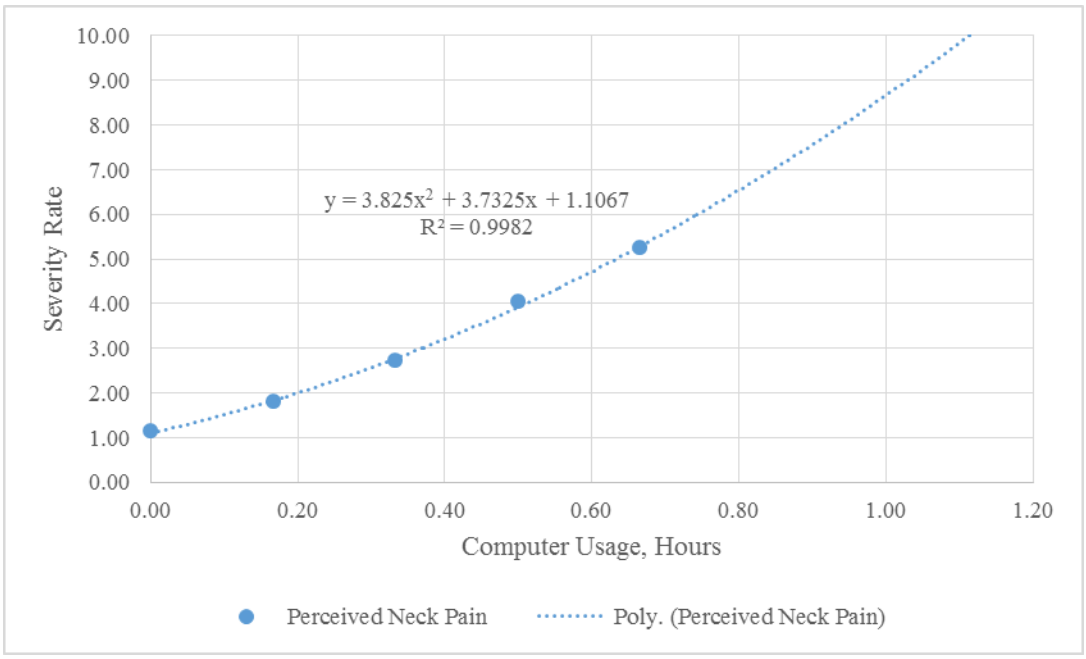

Figure 5: The change in perceived neck pain with duration of computer (monitor placing at side)

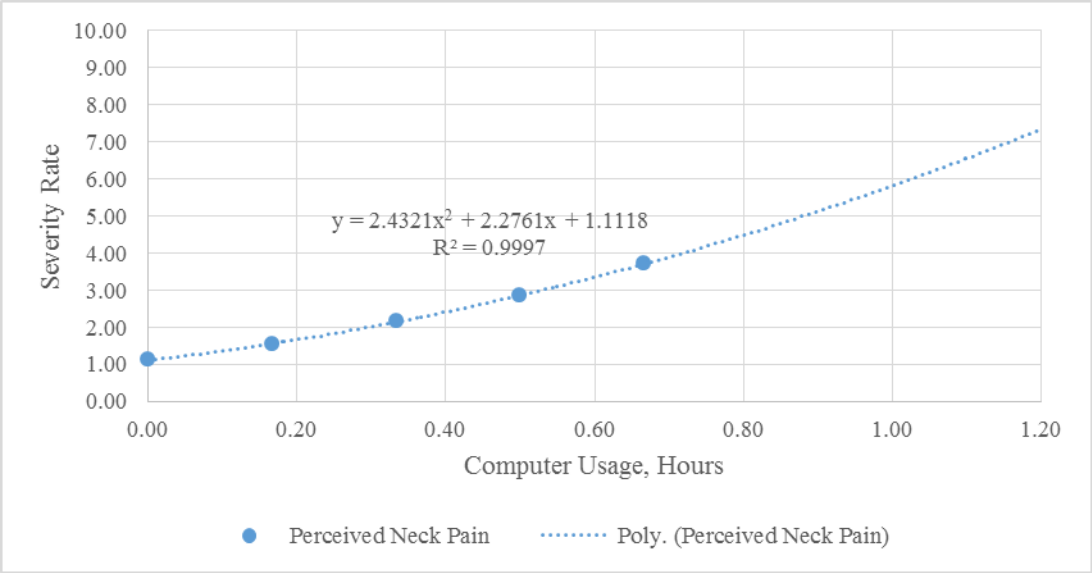

Figure 6: The change in perceived neck pain with duration of computer usage (Using laptop)

From the equations based on extrapolation models, it can be assumed that the perceived neck pain was predicted to increase continuously with duration of the computer. Hence, associated with the extrapolation findings for all workstation setup, the workers are suggested to take a short break, the latest, at 30th to 40th minute of computer work, just at the middle severity point, as continuing working may result in more severe ache and pain in the muscle. It also suggested avoiding doing computer work by locating the monitor screen to the side because it drastically increased the severity of the neck pain, that has shown in forecasting model at 60th minutes of computer work, have reached high severity rate. For short term improvement, getting rest is the best resort. The findings of this study can be utilized as a guideline to put a cut-off point between the computer task and the rest break. It is suggested for an organization to put a restriction on time spent on a computer by the staffs to avoid unwanted injuries, as well as increase work productivity. Other researchers determined that frequent micro-breaks of 30 seconds once every 20 to 40 minutes were an effective means to reduce Work-Related Neck Pain and that these micro-breaks had no adverse effect on worker productivity (Green, 2008). Department Of Safety and Health Malaysia also issued a guideline for work pause and rest to avoid musculoskeletal symptoms among intensive computer users (DOSH Malaysia, 2003). Rest pauses are a physiological necessity if performance, efficiency, and wellbeing are to be maintained. The intensive computer users are recommended to divide the daily work into four hours' period, separately by one rest pause of 10-15 minutes in the morning and afternoon and 45 minutes at midday. All breaks should take away from the workstation. A sustained sitting posture should not be maintained for more than 20 minutes and it is recommended that the computer users change task after a maximum of 50 minutes of the period of at least 10 minutes (DOSH Malaysia, 2003). Also, awareness of the work in a safe environment and ergonomics should apply to each employee. It is suggested that every employee should to rearrange the workstation in ergonomically.

Due to limitations, these extrapolation models only forecasted a short time frame which would have a higher probability of success. In a future study, it is suggested to prolong

the experiment with more data points in order to obtain a longer range of pattern changes in perceived neck pain.

4.0 CONCLUSION

This paper presents an inclusive study on the effect of prolonging computer usage with perceived neck pain among women workers in three types of workstation arrangement. The findings were affirmed that the first workstation setup (monitor screen placing in front of respondent) has significantly given less severity on the neck rather than others workstation setup. In this workstation setup, neck cervical flexion angle was reduced significantly after 40 minutes of typing. The perceived neck pain's score was increasing with the time spent on computer work and became significant after 40 minutes of typing. It is different from the second workstations setup where gave worse effects and highest severity rate. The perceived neck pain score was significantly correlated with the duration of computer work as well as neck cervical flexion angle, showing that the occurrence of neck injuries was closely related to the time spent on computer work and the position of the monitor screen.

These findings may inform employers about the importance of proper job scheduling in order to prevent any injuries. Since this study emphasized on the significant contribution of longer duration at the computer to the higher perceived neck pain on various workstation setup, employers can encourage the workers to take regular short rest break the latest at 20^{th} to 40^{th} minute of computer work and to alternate with a non-computer work task. The improper workstation setup must be avoided due to it will give the maximum severity of neck pain if using a computer longer. Implementation of the better ergonomic environment may help the human force to work more effectively, efficiently and productively on their jobs, and eventually creates a successful organization.

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