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Carpal Tunnel Syndrome and Impact of Computer Use on Civil Engineering Department Lecturers at Polytechnic Sultan Abdul Halim Mu'adzam Shah

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Abstract: This study was conducted to identify the severity of Carpal Tunnel Syndrome among lecturers in the Department of Civil Engineering at the Polytechnic Sultan Abdul Halim Mu'adzam Shah when using computers while working. This study was carried out using the Boston Carpal Tunnel Questionnaire as an instrument for 80 lecturers of the Department of Civil Engineering, consisting of 42 male lecturers and 38 female lecturers. Descriptive analysis was used to analyze the data in this study. The findings showed that the severity of Carpal Tunnel Syndrome lecturers of the Department of Civil Engineering on using computers when working is low, with a value of 1.6 for the Symptoms Severity Scale and 1.7 for the Functional Status Scale. Considerations for the computer's layout and the correct hand position when using the computer should be taken into account. Suggestions such as exposure to stretching exercises and ergonomic equipment should be submitted to management to reduce pain caused by using computers in the workplace. To reduce the pain caused by computer use in the workplace, suggestions such as exposure to stretching exercises and ergonomic equipment should be submitted to management.

Keywords: Carpal tunnel syndrome, symptoms severity scale, functional status scale

1. Introduction

Using a keyboard and mouse when using a computer repeatedly or constantly has been a matter of debate and concern among Carpal Tunnel Syndrome disease researchers. According to statistics released by the Department of Occupational Safety and Health, Carpal Tunnel Syndrome is one of the diseases that have many complaints and reports besides other diseases such as Musculoskeletal Disorders, Temporary Back Pain, and Upper Limb Disorder in Malaysia (DOSH selects 16 firms as Sohelp pioneers, 2016). This disease has been said to be one of the musculoskeletal disorders and a cause of computer-related occupational hazards (Bhanderi et al., 2017). Carpal Tunnel Syndrome is a recurrent strain injury that stimulates tendon bending and compression of the median nerve, which flows through the wrist's carpal tunnel. The function of the median nerve is to control the movement of the hand by sending signals from the hand to the brain to act on something. According to the National Institute of Neurological Disorders and Stroke (2020), the disease is more common among people doing the same task over a long period, such as factory workers, tailors, sanitary workers, and educational institutions. These occupations are more prone to be affected by Carpal Tunnel Syndrome because they are closely related to using hands over a long period. For that purpose, the researcher has conducted a study to evaluate the level of Symptoms Severity Scale (SSS) and Functional Status Scale (FSS) among lecturers of the Department of Civil Engineering at Polytechnic Sultan Abdul Halim Mu'adzam Shah (Isa et al., 2020). In addition, this study will also assess the severity of Carpal Tunnel Syndrome as a whole based on the level of the Symptoms Severity Scale (SSS) and Functional Status Scale (FSS) obtained. This study needs to be implemented because there still needs to be more information on Carpal Tunnel Syndrome in the field involving educational institutions (Jenkins et al., 2013). Most research in the education sector is done to assess pain in the wrist or hand in Turkey, Australia, and India (Vaghela & Parekh, 2018; Erick & Smith, 2014; Korkmaz et al., 2011).

To assess the Symptoms Severity Scale (SSS) and Functional Status Scale (FSS) among lecturers of the Department of Civil Engineering at Polytechnic Sultan Abdul Halim Mu'adzam Shah. Besides, this study will also assess the severity of Carpal Tunnel Syndrome as a whole based on the level of the Symptoms Severity Scale (SSS)

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and Functional Status Scale (FSS) obtained. The research question in this study follows:

1) What is the Symptom Severity Scale (SSS) level among the Department of Civil Engineering lecturers at the Polytechnic Sultan Abdul Halim Mu'adzam Shah?
2) What is the Functional Status Scale (FSS) level among the lecturers of the Department of Civil Engineering at the Polytechnic Sultan Abdul Halim Mu'adzam Shah?
3) What is the severity of Carpal Tunnel Syndrome CTS as a whole based on the level of Symptoms Severity Scale (SSS) and Functional Status Scale (FSS) among the lecturers of the Department of Civil Engineering at Polytechnic Sultan Abdul Halim Mu'adzam Shah?

2. Literature Review

In educational institutions, using computers to complete tasks such as creating notes, teaching materials, and obtaining information is routine. Educators in Malaysia work approximately six (6) to eight (8) hours per day. During working hours, educators spend roughly four (4) hours on computers. According to Jenkins et al. (2013), employment factors such as the number of working hours, changes in working hours, and working with computers among educators may be associated with a higher risk of Carpal Tunnel Syndrome disease. The disease is difficult to detect in the early stage and only shows early signs such as sensory loss or frequent numbness in one or both hands. These symptoms frequently strike people at night, making it difficult to sleep. Some people experience pain up to the upper arm at a critical stage. After that, they will gradually lose the strength to lift small objects with their hands.

Carpal Tunnel Syndrome has become one of the most common diseases in society today, with rates as high as 2.7 to 5.8% of individuals suffering from it (Atroshi et al., 2007; Ferry et al., 1998). Evidence suggests that heavy work and repetitive work in the industrial sector contribute to Carpal Tunnel Syndrome (Abbas et al., 1988; Frost et al., 1998). However, an increment in computer use and musculoskeletal concerns may contribute to the risk of Carpal Tunnel Syndrome. Previous research has suggested that computer use and Carpal Tunnel Syndrome are related (Gerr et al., 2002). However, there are published studies showing opposite findings (Barcenilla et al., 2012; Van Rijn et al., 2009), and some other studies conclude there is no evidence for such a relationship (Shiri & Falah-Hassani, 2015; Palmer et al., 2012).

3. Methodology

This study was conducted on 80 lecturers of the Department of Civil Engineering at the Polytechnic Sultan Abdul Halim Mu'adzam Shah. The Boston Carpal Tunnel Questionnaire developed by Fischer et al. (2014) and Levine et al. (1993) was used to assess symptom severity and functional status in patients with Carpal tunnel syndrome. The questionnaire is divided into two parts, which are the Symptoms Severity Scale and the Functional Status Scale. In the Symptoms Severity Scale section, there are 11 questions related to the symptoms experienced by the individual, such as the level of pain during the day and night, the time of pain during the day, numbness, tingling, and difficulty in grasping. Meanwhile, the Functional Status Scale is related to the difficulty level in performing daily activities such as writing, buttoning clothes, holding books while reading and lifting items. Each question on the Symptoms Severity Scale has five (5) answers based on a scale of one (1) to five (5) according to the increasing level of pain, as shown in Table 1. Descriptive statistics such as mean were used to analyze the data findings in this study. According to Storey (2009), the mean value for each question was analysed to identify which symptoms the highest and lowest occurred to the individual. He also thinks that individuals with a Symptoms Severity Scale score of 23 need to seek treatment to address this Carpal tunnel syndrome problem.

Table 1: Symptom level based on total score symptom severity scale

Total score symptoms severity scale	Symptom level
11	Non
12 to 22	Minor
23 to 33	Moderate
34 to 44	High
45 to 55	Critical

The Functional Status Scale has a score of the difficulty level of doing daily activities such as level 1 (not difficult), level 2 (slightly difficult), level 3 (moderately difficult), level 4 (very difficult), and level 5 (cannot do the activity at all). Caused by symptoms. Table 2 shows the symptom level based on the total score symptoms severity scale.

Table 2: Functional status based on the number of scores functional status scale

Total score functional status scale	Difficulty level
8	Non
9 to 16	Minor
17 to 24	Moderate
25 to 32	High
33 to 40	Critical

To determine the severity level of Carpal Tunnel Syndrome as a whole, the total number of answers to the Symptoms Severity Scale and Functional Status Scale questions should be divided by the number of questions to identify the severity level of Carpal Tunnel Syndrome symptoms. This method can also be used to determine the severity of Carpal Tunnel Syndrome on average for the population studied. Table 3 shows the severity level of Carpal tunnel syndrome based on score.

Table 3: Severity level of Carpal tunnel syndrome based on score

The score of symptoms severity scale & functional status scale	Level of severity carpal tunnel syndrome
1	Non
1.1 to 2	Minor
2.1 to 3	Moderate
3.1 to 4	High
4.1 to 5	Critical

4. Results

The respondents of the study consisted of 42 (52.5%) male lecturers and 38 (47.5%) female lecturers, and of the total respondents, 1% (n = 1) were aged between 21-30 years, 26% (n = 21) were aged between 31-40 years, 65% (n = 52) were aged between 41–50 years and 8% (n = 6) were aged between 51–60 years. The number of respondents in terms of using hands to perform daily activities is 66% (n = 53) using the right hand and 34% (n = 27) using the left hand. Of the 80 lecturers taken as a sample for this study, only two (2) respondents had ever undergone Carpal Tunnel Syndrome surgery. The study's results for the analysis based on the average value for each question Symptoms Severity Scale found that the average value of the highest score is 1.82. Lecturers often experience numbness and tingling at night (S9). The second most common symptom that occurred in lecturers was severe pain in the hands at night (S1), and the frequency of experiencing pain kept individuals awake at night (S2). Both of these symptoms have the same mean score value of 1.8. The item with the lowest average score value is the difficulty experienced by individuals to pick up and use small objects such as keys and pens, which is 1.45. For the analysis of the mean values for each Functional Status Scale question, there were two highest similar values, namely opening the bottle cap (F6) and carrying a plastic bag (F7), with values of 2.13 and 2.12, respectively. Item F8, which is doing bathing and dressing activities, has the lowest score for the Functional Status Scale question, which is 1.3.

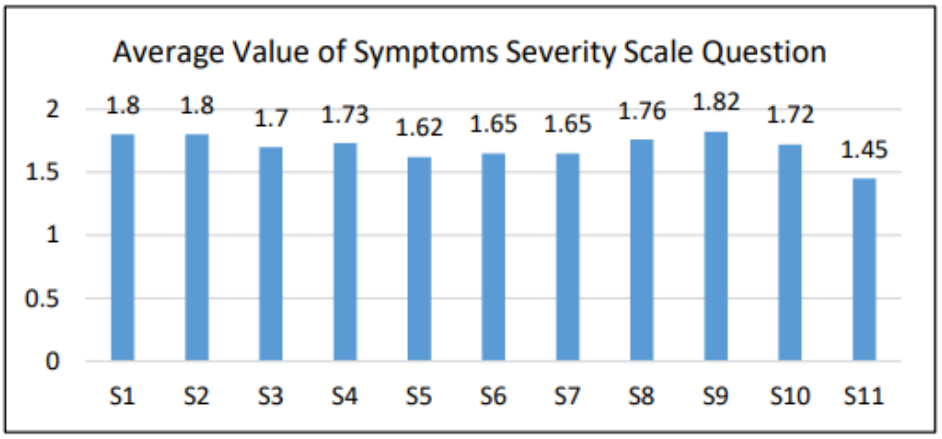

Fig. 1: Average value of question score symptoms severity scale

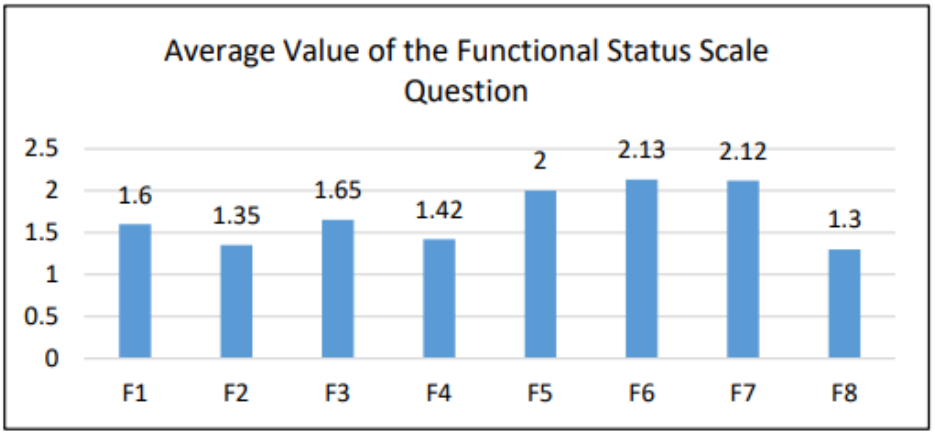

Fig. 2: Average value of the functional status scale question score

For the overall average score value for the severity of Carpal Tunnel Syndrome for lecturers of the Department of Civil Engineering at Polytechnic Sultan Abdul Halim Mu'adzam Shah, the value of the Symptoms Severity Scale is 1.6 while the value for the Functional Status Scale is 1.7. This indicates that the lecturer's severity level for both scores' Carpal Tunnel Syndrome is low. Table 3 shows the data score of the symptoms severity scale and functional status scale.

Table 4: Overall average score of symptoms severity scale and functional status scale

Characteristics	n	Total amount	Overall average
Symptoms severity scale	80	134.8	1.6
Functional status scale		136.2	1.7

5. Discussion

The findings from other studies also show similar results. Atroshi et al. (2007) conducted a study on 2465 respondents, and the results of the study showed no relation between Carpal Tunnel Syndrome and computer use. In addition, the study conducted by Andersen et al. (2003) is also related to Carpal Tunnel Syndrome and computer use. He has conducted a study on 9480 union technicians with a response rate of 6943 people. He also made a follow-up study after one year with 5658 people participating. However, the study results have a similar relevance in that the use of computers does not cause symptoms of Carpal Tunnel Syndrome. Computer-related workers were found to be at lower risk than workers in food processing, manufacturing, services, and construction (Mediouni et al., 2015). However, few studies show the opposite result that there is a positive relationship between computer use to Carpal Tunnel Syndrome (Thomsen et al., 2002).

According to a study by Ali and Sathiyasekaran (2006), the longer the computer exposure and computer use in daily life, the higher the chances of getting Carpal Tunnel Syndrome. Among other studies that align with a significant relationship with computer use are (Nakazawa et al., 2002; Matias et al., 1998; Hales et al., 1994).

6. Conclusion

This study aimed to determine the severity of Carpal Tunnel Syndrome among lecturers of the Department of Civil Engineering at the Polytechnic Sultan Abdul Halim Mu'adzam Shah when using a computer while working. The results showed that the overall average score of the Symptoms Severity Scale was 1.6, and the Functional Status Scale was 1.7. Therefore, it can be concluded that JKA lecturers have experienced a low severity of Carpal Tunnel Syndrome, which is in the range of scores from 1.1 to 2. However, the findings of this study are still weak because they do not consider the risk of other Carpal Tunnel Syndrome factors such as obesity, diabetes, pregnancy, and arthritis. The study conducted by Paiva et al. (2020) found that Carpal Tunnel Syndrome is commonly found in patients with diabetes. Therefore, a more comprehensive study must be done for better and more accurate results. Management and lecturers need to make this study a target to change work style with an emphasis on health in the workplace. Considerations regarding the layout of the computer position and the correct hand position when using the computer should be considered. Lecturers need to be exposed to simple stretching exercises so the blood flow runs smoothly to the rest of the body. Ergonomic office equipment should also be provided by management so that the severity of Carpal Tunnel Syndrome can be curbed and indirectly increase productivity (Kogi et al., 2003) as well as profitability to the organization (Lin et al., 2018).

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