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The Relationship of Long Work When Using Laptop With Carpal Tunnel Syndrome (CTS) in College Students

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Abstract. Carpal tunnel syndrome is one musculoskeletal disorder that often occurs in work that uses the wrist repeatedly in a position that is not ergonomic for a long time. Use of laptops by students sometimes does not pay attention to ergonomics when typing by using a laptop properly and correctly, so it becomes one of the risk factors for CTS. This study aimed to determine the prevalence of a long-standing relationship between p CTS events, repetitive movements, and wrist posture with CTS incidence in students of the Class of 2017 IKM UNDANA Study Program. This research is a type of quantitative research cross-sectional study design. This study showed no relationship between long-standing with using the laptop, repetitive movements, and wrist posture with complaints of carpal tunnel syndrome in students of the class of 2017 IKM UNDANA study program. This research shows that there needs to be good time management when typing using a laptop, especially for students.

Keywords: *carpal tunnel syndrome; length of work*

Abstrak. *Carpal tunnel syndrome* merupakan salah satu gangguan *muskuloskeletal* yang sering terjadi pada pekerjaan yang menggunakan pergelangan tangan secara berulang-ulang dengan posisi yang tidak ergonomis dengan waktu yang cukup lama. Penggunaan laptop oleh mahasiswa terkadang tidak memperhatikan ergonomi saat mengetik dengan menggunakan laptop dengan baik dan benar, sehingga menjadi salah satu faktor resiko terjadinya CTS. Tujuan dari penelitian ini adalah untuk mengetahui prevalensi kejadian CTS, hubungan lama kerja, gerakan repetitif dan postur pergelangan tangan dengan kejadian CTS Pada Mahasiswa Angkatan 2017 Program Studi IKM UNDANA. Penelitian ini merupakan jenis penelitian kuantitatif dan rancangan studi C*ross Sectional*. Hasil penelitian ini menunjukkan bahwa tidak terdapat hubungan lama kerja, gerakan repetitif dan postur pergelangan tangan dengan keluhan *carpal tunnel syndrome* pada Mahasiswa Angkatan 2017 Program Studi IKM UNDANA. Penelitian ini menunjukkan bahwa, perlu adanya manajemen waktu yang baik saat mengetik dengan menggunakan laptop bagi terutama bagi mahasiswa.

Kata Kunci: *carpal tunnel syndrome, lama kerja*

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Introduction

The development of the times has influenced technological progress. Along with developing an increasingly modern era, technology is also advancing. A laptop or portable computer is one of the technological advances experiencing rapid growth and demand in almost every workgroup. Laptop sales increased by 35.45% from 753,000 units to 1.02 units (IDC,2010) from BPS in 2019, computer users in Indonesia were 18.78%, with internet access using computers was 5, 47%, laptops 15.78%, and mobile phones 96.95% (Central Bureau of Statistics, 2019). The number of internet access via smartphones is 95.4%, 19.7% from laptops, and 9.5% from computers or PCs (APJII, 2020).

The use of a laptop does make it easier for users to do work. However, using a laptop for a long time can cause various health problems such as musculoskeletal disorders. Musculoskeletal disorders occur due to a lack of understanding of ergonomics (Wicaksono, Suroto, 2016). Using laptops can cause musculoskeletal disorders due to non-ergonomic laptop designs and is supported by user behavior that does not pay attention to ergonomics when using a laptop, such as a date position or posture. The laptop's odd and non-ergonomic design causes the hand movement to type to be narrow. Thus affecting musculoskeletal disorders, one of which is the complaint of Carpal Tunnel Syndrome (CTS). CTS is caused by repetitive and excessive hands and activities that require the fingers to move for an extended period. CTS is caused by neuropathic pressure on the median nerve that passes through the carpal tunnel, which can occur due to exposure to vibration, repetitive activities, strong directives, and hand positions that are not ergonomic during activities (Septiawati & Hasyim, Hamzah, 2013; Aripin et al. 2019)

Research conducted on Architectural Engineering Students at Diponegoro University illustrates that 32.2% of students have carpal tunnel syndrome in the right hand, and 40.7%

have carpal tunnel syndrome in the left hand. This is due to non-ergonomic work techniques, repetitive work on the same hand with long duration, and systemic disease (diabetes and arthritis) (Nissa et al., 2015). Length of work or duration of work can aggravate Carpal Tunnel Syndrome complaints. Jobs with a long working time of 4 hours per day have a close relationship with the incident of Carpal Tunnel Syndrome complaints. The research results conducted by Suherman et al., 2012 stated that the proportion of CTS occurred more in workers who had jobs with a length of 4-8 hours (94.9%).

The final semester students of the 2017 IKM Study Program are the students who most often interact with laptops to complete their final project in the form of a thesis. The use of laptops by final semester students of the IKM Study Program to do thesis sometimes does not pay attention to the ergonomics aspect of using a laptop. The research data showed that 75% of students experienced moderate risk, and 25% experienced a high risk of proper wrist posture. While in the left wrist posture, 70% experienced medium risk, and 30% experienced medium risk. The results of the observation show that the awkward posture that is often done by students when typing is a bent wrist posture and forms flexion or extension when typing. This can support the occurrence of carpal tunnel syndrome due to the non-ergonomic design of the laptop, causing the emergence of risk factors for the incident of CTS. Such as hand postures that are not ergonomic and working hours that are too long, causing the emergence of risks in the form of repetitive movements or repetitive movements of the wrist and the radius with a reasonably long frequency. This study aims to determine the relationship between the length of work when using a laptop with the incidence of Carpal Tunnel Syndrome (CTS) in Class 2017 Students of the UNDANA IKM Study Program.

Method

This research is a type of quantitative research with a cross-sectional study design. The statistical test used in this study is the chi-square test. Students of the 2017 IKM UNDANA Study Program, with a total of 360 people, are the population of this study. And

sample amounted to 76 people. It was taken using a simple random sampling technique that met the inclusion and exclusion criteria. Inclusion criteria: final semester students of the IKM Study Program class of 2017 who are currently actively working on the thesis, have a laptop and are willing to be respondents. Exclusion criteria are IKM Study Program students class of 2017 who are not actively working on the idea, IKM Study Program students class of 2017 who are not willing to be respondents of IKM Study Program students who are not class 2017 and have a history of hand or wrist disease, diabetes mellitus, autoimmune disease, trauma, and impaired liver and kidney function. The instrument in this study used a Carpal Tunnel syndrome questionnaire adopted from research (Sabila, 2019) which was referred from the Dartmouth Hitchock medical center hand clinic; this questionnaire was developed based on the BTCQ (Boston Carpal Tunnel Syndrome).

Results

Table 1
The Relationship of Length of Work When Using a Laptop with Carpal Tunnel Syndrome Incidence in Class 2017 Students of IKM UNDANA Study Program

Laptop Usage time	*Carpal Tunnel Syndrome* (CTS)						Total	%	p-value
	average		mild		moderate				
	n	%	n	%	n	%			
< 4 hours	4	5.3	8	10.5	6	7.9	18	24	0,092
≥ 4 hours	6	7.9	16	21.1	36	47.4	58	76	
total	10	13.2	24	31.6	42	55.3	76	100	

The table above shows that in the variable duration of laptop use with a time of < 4 hours, the number of average respondents is four people (5.3%), respondents who experience mild CTS complaints are eight people (10.5%), and respondents who experience moderate CTS complaints. As many as seven people (7.9%) while the duration of using a laptop for 4 hours of respondents who did not experience CTS complaints was seven people (7.9%), and respondents who experienced mild CTS complaints were 16

people (21.1%). and respondents who experienced moderate CTS complaints were 36 people (47.4%).

The results of statistical tests using the Chi-Square test obtained a p-value. Value, 0.092 < = 0,05, so the results obtained show no significant relationship between the length of time using a laptop and complaints of carpal tunnel syndrome in Class 2017 students of the Undana IKM Study Program.

Discussion

Length of work is the duration or length of time a person works in a day. Prolonged working hours can cause a decrease in the quality of work, tend to experience fatigue, and are at risk of exposure to work-related diseases and work accidents (Hamid et al., 2020; Saleha, 2017). The long duration of work indicates repetitive work, so the longer it can affect the occurrence of the nerves resulting in Carpal Tunnel Syndrome disorders(Hamid et al., 2020)

This study indicates no relationship between the length of work when using a laptop with the incidence of Carpal Tunnel Syndrome (CTS). The length of exposure to CTS risk is determined by the length of work of the worker himself. Gandrean (1988) states that with the length of work, as long as the worker is exposed to the indicators causing CTS (Hartanti et al., 2018). The length of work 4 hours does not mean that students spend time just typing, but there may be breaks when using laptops. Rest will give the body a chance to recover. When typing, the muscles in the wrist become static in the hands so that the duration of laptop use increases, and at rest occurs, relaxation or relaxation of the muscles.

This study also shows that the length of work using a laptop with 4 hours and a duration of <4 hours can be exposed to CTS. This problem is because the length of time students use laptops to work on a thesis is not always static and erratic. However, it is also caused by other risk factors such as repetitive movements and wrist posture when typing on a laptop keyboard. Students who use laptops to do thesis do not always work with the exact duration of work, in the sense that these students do not always have to work for 4 hours per day. However, these students can work according to their wishes, abilities, and

willingness to immediately complete the revision given by the lecturer. The results of observations made, one of the factors that caused students to use laptops to do a 4-hour thesis was due to pressure factors or deadlines to immediately complete revisions in a short time. Symptoms of CTS What is often experienced by students who work for 4 hours is a sense of loss of sensation (numbness) in the hands, weakness in the hands, and a feeling of tingling in the hands.

The length of work with a long duration of time when working on a thesis using a laptop is one of the factors that can trigger the onset of CTS symptoms and exacerbate these symptoms. The longer or more time spent working using a laptop, the more exposure to risk factors for CTS will increase. Accident Compensation Corporation 2014 explained that several things could increase the risk of CTS occurrence in a worker, including the lack of rest time of at least 15% of the daily working time (Stephenson, 2014). This study is in line with research conducted by (Nissa et al., 2015)which stated that there was no relationship between the length of work and CTS complaints in students of the Faculty of Engineering majoring in architecture. This study is also in line with the research conducted by Suherman et al., 2012 on computer rental officers in Kahuripan Village, where the proportion of CTS events is more common in officers with 4-8 hours of work (94.9%) compared to 4 hours per day. (27.3%) who experienced the incidence of CTS.

Conclusion

This study indicates no relationship between the length of work while using a laptop with the incidence of carpal tunnel syndrome in college students. Students who use laptops for work with a duration of < 4 hours and 4 hours of experience can get tingling in the hands, loss of sensation (numbness), and weak hands. These symptoms are influenced by activities while using a laptop, such as repetitive movements when typing and using the touchpad and mouse. In addition to repetitive movements, wrist posture factors that are not ergonomic can also affect the occurrence of Carpal Tunnel Syndrome. Repetitive movements and hand postures that are not ergonomic if done for a long time while working can trigger the symptoms of carpal tunnel syndrome. These symptoms include pain, tingling,

numbness, and weakness in the hands. These symptoms can interfere with the comfort and concentration of students in doing their work. Therefore, it is necessary to have good working time management to avoid the risk of being exposed to carpal tunnel syndrome.

Students of the 2017 class of the IKM study program can reduce the risk of CTS symptoms by setting a schedule, namely limiting work to 2 hours interspersed with 30 minutes of rest and being able to stretch their wrists and fingers, either before or during breaks or when they finish typing. Stretching exercises performed statically on the wrist can prevent CTS from occurring. This exercise can be done every day, like three times within 5 minutes. Regular stretching of the wrist muscles can reduce the symptoms of CTS because it can gradually repair the median nerve trapped in the carpal tunnel at the wrist (Tana, 2012).

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