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The Relationship Between Online Gaming Duration And Symtoms Of Carpal Tunnel Syndrome In Medical Students At Universitas Muhammadiyah Sumatera Utara

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Abstract

According to a survey by the Indonesian Internet Service Providers Association (APJII), 35.97% of internet users aged 12–27 years play online games, and players tend to spend an average of 2–8 hours per day gaming. Online gaming addiction can have negative effects, including reduced social interaction with family, declining academic performance, and physical health problems. Commonly reported health problems include headaches, back pain, repetitive strain injuries, and carpal tunnel syndrome (CTS). This study aimed to determine the association between online gaming duration and CTS symptoms. A descriptive-analytical study with a cross-sectional approach was conducted among 57 respondents recruited using non-probability sampling. Data were analyzed using the chi-square test. Bivariate analysis showed that, among the 40 respondents (70.2%) with CTS symptoms, 21 were high-duration gamers. Among respondents without CTS symptoms, 17 (29.8%) were light-duration gamers. Online gaming duration was significantly associated with CTS symptoms, as demonstrated by the chi-square test ($p < 0.001$).

Keywords: Carpal Tunnel Syndrome, Gaming Duration, Online Games.

INTRODUCTION

Carpal tunnel syndrome (CTS) is a neuropathic disorder caused by compression of the median nerve as it passes through the carpal tunnel at the wrist, resulting in increased pressure within the tunnel.

The prevalence of CTS among adults has been reported to be approximately 1.55%, or around 2.6 million people. In the general population, the estimated prevalence is 3% in women and 1% in men. Prevalence is higher among people aged 25–34 years than among those younger than 25 years. Excessive physical activity and repetitive movements can contribute to CTS.

CTS may arise from various extrinsic and intrinsic factors. Extrinsic factors include repetitive wrist movements, hand movements during activities such as pinching, strong tendon contractions, and mechanical pressure on the median nerve. Intrinsic factors include body mass index, fractures, diabetes, and other comorbid conditions.[10]

According to the 2024 survey by the Indonesian Internet Service Providers Association (APJII), the number of internet users in Indonesia increased to 221.56 million, representing 79.50% of the population. Among these users, 35.97% of those aged 12–27 years played online games. This age range includes adolescents and young adults, who commonly spend an average of 2–8 hours per day playing online games.

Online games are popular among children, adolescents, and adults, particularly university students. Gaming can stimulate interest and provide enjoyment and challenge, but it may also lead to excessive use and addiction. Negative consequences of online gaming addiction include social withdrawal, reduced concentration and academic performance,

fatigue, and adverse effects on physical health. Frequently reported problems include headaches, neck pain, back pain, and recurrent muscle strain.

Online gamers may be at risk of developing CTS, whose symptoms include numbness, tingling, and wrist pain. During gaming, players often maintain static hand positions and repeat similar movements for long periods each day. These movements include wrist flexion and extension and repetitive finger movements to click, drag, scroll, tap, and press a smartphone screen or mouse. Such repetitive activity may affect the median nerve and increase the risk of CTS.

The intensity of online gaming tends to increase with the amount of time spent playing and decrease as gaming frequency increases. Previous research by Yafizahran (2022) concluded that playing online games for longer periods was significantly associated with CTS complaints among first-year senior high school students in Jambi. Therefore, this study aimed to determine the association between online gaming duration and CTS symptoms among medical students at Universitas Muhammadiyah Sumatera Utara.

RESEARCH METHODS

This observational study used an analytical approach to assess the association between online gaming duration and CTS symptoms among medical students at Universitas Muhammadiyah Sumatera Utara. A cross-sectional design was applied. The independent variable was online gaming duration, and the dependent variable was CTS symptoms.

Participants were medical students at Universitas Muhammadiyah Sumatera Utara who belonged to the Mobile Legends online gaming community. Non-probability sampling was used, specifically purposive sampling based on criteria established by the researchers. A correlation-based sample-size calculation indicated a minimum sample of 42 respondents. The study was conducted at the Faculty of Medicine, Universitas Muhammadiyah Sumatera Utara.

Data on CTS symptoms and online gaming duration were collected using a questionnaire distributed through Google Forms. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) and described in relation to online gaming duration and CTS symptoms among medical students at Universitas Muhammadiyah Sumatera Utara.

Univariate analysis described the characteristics of online gaming duration and CTS symptoms by presenting frequency distributions and percentages for each variable. Bivariate analysis was used to assess the association between the two variables. The chi-square test was used for statistical analysis.

RESULTS AND DISCUSSION

Sample on study This A total of 57 individuals met the inclusion and exclusion criteria at the Faculty of Medicine, Muhammadiyah University of North Sumatra. This study identified the demographic characteristics of the sample based on gender and age. The frequency distribution of the respondents' demographic characteristics is presented in Table 1.

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics Respondents	Frequency (n)	Percentage (%)
Gender		
Man	31	54,4
Woman	26	45,6
Age		
18 years	3	5,3
19 years	6	10,5
20 years	24	42,1
21 years	17	29,8
22 years	7	12,3
Total	**57**	**100**

Based on table 1, it shows that from the total sample of 57 respondents, the gender characteristics are dominated by men, amounting to 31 respondents (54.4%), the age characteristics are dominated by 20 years old, amounting to 24 respondents (42.1%), and the fewest are 18 years old, amounting to 3 respondents (5.3%).

Table 2. Distribution of online gaming duration

Gaming duration	Frequency (n)	Percentage (%)
light gamers	36	63,2
High gamers	21	36,8
Total	**57**	**100**

Based on the data information in 2 shows light gamers formed the largest group, comprising 36 of the 57 respondents (63.2%).

Table 3. Distribution of online gaming frequency

Gaming frequency	Frequency (n)	Percentage (%)
Occasionally	25	43,8
Frequently	32	56,2
Total	**57**	**100**

Based on the data information in table 3 shows the number of the total sample of 57 respondents, that the duration and frequency of playingonline game the most frequent category is with a frequently distribution of 32 respondents (56.2%).

Table 4.Distribution of carpal tunnel syndrome symptoms

CTS symptoms	Frequency (n)	Percentage (%)
Present	40	70,2
Absent	17	29,8
Total	**57**	**100**

As shown in Table 4, CTS symptoms were present in 40 respondents (70.2%), whereas 17 respondents (29.8%) did not report symptoms.

Table 5. Severity category respondents with CTS symptoms

Symptom category	Frequency (n)	Percentage (%)
Mild	37	92,5
Moderate	3	7,5
Total	**40**	**100**

Based on the data information in table 5, it shows that in this study, among the 40 respondents reporting CTS symptoms, 37 (92.5%) were classified as having mild symptoms and 3 (7.5%) as having moderate symptoms.

Table 6. Bivariate analysis of online gaming duration and CTS symptoms

Gaming duration	Symptoms *Carpal Tunnel Syndrome*						P Value
	Present		Absent		Total		
	n	%	n	%	n	%	
Light gamers	19	52,8	17	47,2	36	100	<0,001
High gamers	21	100	0	0	21	100	
Total	**40**	**70,2**	**17**	**29,8**	**57**	**100**	

Based on the data information in table 6, it shows that there are symptoms were reported by all 21 high-duration gamers (100%) and by 19 light gamers (52.8%). The absence of symptoms was concentrated among light gamers 17 (47.2%). Chi-square analysis showed a statistically significant association between online gaming duration and CTS symptoms ($p < 0.001$).

Table 7. Bivariate analysis of online gaming frequency and CTS symptoms

Gaming frequency	Symptoms *Carpal Tunnel Syndrome*						P Value
	Present		Absent		Total		
	n	%	n	%	n	%	
Occasionally	8	32	17	68	36	100	<0,001
Frequently	32	100	0	0	32	100	
Total	**40**	**70,2**	**17**	**29,8**	**57**	**100**	

Based on the data information in table 7, it shows that all respondents who played frequently reported CTS symptoms (32; 100%). Among occasional players, 8 (32%) reported symptoms and 17 (68%) did not. The chi-square test indicated a significant association between gaming frequency and CTS symptoms ($p < 0.001$).

This study included 57 respondents who played online games. The univariate demographic analysis showed that the most common age was 20 years (42.1%). This finding is consistent with APJII survey results indicating that the largest group of online gamers in Indonesia is aged 16–24 years, accounting for 35.97%. It is also consistent with Putra (2020), whose respondents were adolescents from middle to late adolescence, and with Wahyuni (2023), in which most respondents were aged 17–25 years (38 respondents; 82.6%).

Regarding sex, male respondents predominated, with 31 respondents (54.4%). This is consistent with Sholikah (2020), who reported 31 male gamers (52%) and 29 female gamers (48%). Angioni (2021) also found that most respondents were male (49; 81.7%), as did Putra (2020), who reported 38 males (95%) and 2 females (5%). This pattern may reflect differences in gaming preferences, including interest in challenges and completing missions within online games.

The online gaming duration data in Table 2 showed that most respondents were light gamers, accounting for 36 respondents (63.2%). This differs from Wahyuni (2023), whose study found that high gamers were the largest group 24 (52.2%). The result is consistent

with Wijaksono (2024), who reported a short-duration category in 50% of nursing students at Universitas Aisyah Pringsewu, and with Widianti (2022), in which light gamers accounted for 26 respondents (57.8%) among medical students at Universitas Batam. In contrast, Angioni (2021), studying the ONIC esports team, reported 29 medium-duration gamers (48.3%), 28 high gamers (46.7%), and 3 light gamers (5%). Putra (2020) also found that 29 respondents (72.5%) played for more than five hours. These differences may relate to participant characteristics: professional gaming communities may spend more time gaming for training and work as well as recreation. Gaming intensity may also be influenced by sex, psychological motivation, and game type.

CTS symptoms were present in 40 respondents (70.2%) among these, 21 were high-duration gamers. Seventeen respondents (29.8%) did not report symptoms, and this group consisted of light gamers. This pattern is consistent with Wahyuni (2023), who reported CTS symptoms in 56.5% of respondents, most of whom were high gamers, and with Apriyani (2024), who found symptoms in 54 respondents (74%), with most symptomatic respondents in the high-gamer category. These findings suggest that prolonged hand activity during online gaming may be associated with the presence of CTS symptoms.

CTS symptoms may develop gradually, beginning with mild symptoms such as paresthesia, reduced sensation, and pain extending from the wrist toward the shoulder, sometimes described as nocturnal brachialgia paraesthetica. Symptoms may then become more persistent as sensory function decreases and pain develops in the thenar muscles. In this study, most symptomatic respondents were categorized as having mild symptoms 37 (92.5%); most of them were light gamers. The three respondents with moderate symptoms were in the high-gamer category. Similar patterns have been reported by Yafizahran (2022), in which mild symptoms were more common among light gamers and moderate symptoms among high gamers, and by Wijaksono (2024), who reported mild symptoms predominantly among light gamers and severe symptoms predominantly among high gamers.

Bivariate analysis in this study showed that CTS symptoms were present in all 21 high-duration gamers, compared with 19 of 36 light gamers. The chi-square test yielded $p < 0.001$, indicating a statistically significant association between online gaming duration and CTS symptoms. Wahyuni (2023) also reported an association between online gaming duration and CTS, with $p = 0.001$. Agung (2024) similarly reported an association between online gaming duration and CTS pain using Spearman analysis ($p = 0.001$). These findings support the possibility that longer daily gaming duration is associated with CTS symptoms; however, a cross-sectional study cannot establish causality.

CTS can be associated with both extrinsic and intrinsic factors. Extrinsic factors include repetitive hand or wrist activity, wrist flexion and extension, and active wrist movements. Intrinsic factors include body mass index and other comorbidities. Online gamers repeatedly flex and extend their wrists and move their fingers to click, drag, scroll, tap, and press a smartphone screen or mouse. Repetitive movements maintained over long periods may increase stress on the median nerve and contribute to CTS symptoms.

Gaming frequency was also associated with CTS symptoms in this study. All 32 respondents who played frequently reported symptoms, whereas 8 of 25 occasional players reported symptoms. This association was statistically significant ($p < 0.001$). The result should be interpreted in light of the study design and sample: the study involved a purposively selected group of medical students from an online gaming community, and the findings may not be generalizable to all students or all online gamers.

CONCLUSION

Most medical students who played online games were classified as light gamers, with a duration of less than 2 hours per day, and most played frequently (3–8 times per week). Most respondents (70.2%) reported CTS symptoms. Statistical analysis showed significant associations between both online gaming duration and gaming frequency and CTS symptoms. Thus, duration and frequency of online gaming were associated with CTS symptoms among medical students at Universitas Muhammadiyah Sumatera Utara.

REFERENCES

Agung P, Deni Y, Azman Zakirah. Komunikasi Virtual Antar Pemain Game Online dalam Membentuk Perilaku Sosial Remaja di Kecamatan Lueng Bata Banda Aceh. J Ilm Mhs FISIP Unsyiah. 2022;7(3):1–16.

Agung Sidhiq Hidayat, Diyono, Warih Anjari Dyah K. Hubungan Durasi Bermain Game Online terhadap Nyeri Carpal Tunnel Syndrome pada Pengguna Wifi Corner di Telkom Sragen. Physio J. 2024;4(1):6–13.

Angioni SA, Giansante C, Ferri N, et al. Hubungan Durasi Bermain Game Online dengan Muskuloskeletal Disorder pada Pemain Esport Tim ONIC di Jakarta. Fish Res. 2021;140(1):6.

Aldris M. Hubungan antara intensitas bermain game online Mobile Legend dengan kecerdasan emosi pada remaja di Game Center Makronet MMTC Medan. Fakultas Psikologi, Universitas Medan Area. Published online 2023.

Apriyani Lestari, WMI. Hubungan Game Online pada Smartphone dengan Kejadian Neck Pain dan Carpal Tunnel Syndrome pada Kelas X dan XI SMK Muhammadiyah 06 Medan. J Mark Manag Res. 2024;29(2):1–24.

Asosiasi Penyelenggara Jasa Internet Indonesia (APJII). Internet Indonesia: Survei Penetrasi Internet Indonesia. Published online 2024:1–73.

Car A, Trisuchon J, Ayaragarnchanakul E, et al. Hubungan antara posisi pergelangan tangan dalam penggunaan laptop terhadap kejadian Carpal Tunnel Syndrome (CTS) pada mahasiswa angkatan 2019 Fakultas Kedokteran Universitas Hasanuddin. Int J Technol. 2023;47(1):100950.

Cazares-Manríquez MA, Wilson CC, Vardasca R, et al. A review of carpal tunnel syndrome and its association with age, body mass index, cardiovascular risk factors, hand dominance, and sex. Appl Sci. 2020;10(10).

Dahlan MS. Statistik untuk Kedokteran dan Kesehatan: Deskriptif, Bivariat, dan Multivariat, Dilengkapi Aplikasi Menggunakan SPSS. Edisi 6. Epidemiologi Indonesia; 2014.

Dahlan MS. Besar Sampel dan Cara Pengambilan Sampel dalam Penelitian Kedokteran dan Kesehatan. Edisi 4. Salemba Medika; 2011.

Dien S, Rantepadang A. Kebiasaan Bermain Game Online dengan Keluhan Kelelahan Mata pada Remaja. Nutr J. 2023;7(1):19.

Ghaisani DA, Jayanti S, Ekawati. Faktor Risiko Kejadian Carpal Tunnel Syndrome (CTS) pada Pekerja Pengguna Komputer: Literature Review. J Kesehat Masy. 2021;9(1):104–111.

Herawan MH, Rachman MY. Pengaruh Nilai Virtual Item terhadap Intensi Pembelian Virtual Item dalam Game Online PUBG Mobile. INOBIS J Inov Bisnis dan Manaj Indones. 2021;5(1):1–12.

Iswara Oka PKDW, Utami S, Setiawan NCT, Tunjung IW. Hubungan indeks massa tubuh dan jenis kelamin dengan derajat keparahan carpal tunnel syndrome di RSUD Kota Mataram. Nusant Hasana J. 2023;2(10):20.

Joscelin A, Suryani E, Astiarani Y, Joewana S. Hubungan antara Adiksi Game Online dengan Kejadian Depresi pada Mahasiswa Kedokteran. 2021;3(2):320–328.

Lebho MA, Lerik MDC, Wijaya RPC, Littik SKA. Perilaku Kecanduan Game Online Ditinjau dari Kesepian dan Kebutuhan Berafiliasi pada Remaja. J Health Behav Sci. 2020;2(3):202–212.

Manora H, Ramadhani Firmansyah M, et al. Hubungan Kecanduan Game Online dengan Tingkat Depresi pada Siswa. Riset Media Keperawatan. 2023;6(2):101–106.

Muawwal MC, Gunawan AP, Sanusi B. Literatur Review: Dampak Game Online terhadap Penggunanya (A Literature Review: The Impact of Online Games on Users). SENMABIS—Seminar Nasional Manajemen dan Bisnis. Published online 2022:16.

Nurullita U, Wahyudi R, Meikawati W. Kejadian Carpal Tunnel Syndrome pada Pekerja dengan Gerakan Menekan dan Berulang. J Kesehat Vokasional. 2023;8(1):1.

Octaviana F, Putra Y, Safri AY, Wiratman W, Indrawati L, Hakim M. Uji validitas dan reliabilitas Kuesioner Sindrom Terowongan Karpal Boston versi Bahasa Indonesia. eJournal Kedokt Indones. 2022;10(1):18–25.

Pengaruh intensitas bermain game online terhadap kecenderungan agresivitas gamers. Fakultas Ilmu Pendidikan, Universitas Negeri Semarang. Published online 2020.

Purnamasari Y, Clara Y, Yesisca, Lady, Immanuel F, Isnaini M. Komunikasi secara virtual para pemain MMORPG Ragnarok X: Next Generation. J Ilm Komun STIKOM IMA. 2023;15(1):48.

Putri RCS, Budiyono, Kokotiasa W. Dampak Game Online Mobile Legends terhadap Perilaku Remaja. J Penelit Ilmu Hum. 2021;1(1):1–7.

Pramandani NLMS, Wirawan IMA. Faktor Risiko Carpal Tunnel Syndrome pada Siswa Sekolah Menengah Atas Pemain Game Online di Kota Denpasar. Arch Community Health. 2021;8(1):91.

Pratiwi W, Adinda Y. Keluhan Carpal Tunnel Syndrome (CTS) pada Operator Mesin Traktor Tangan (Studi di Desa Balung Kulon, Kecamatan Balung, Kabupaten Jember). 2019.

Pratiwi FO, Herlina, Utomo W. Gambaran Keluhan Carpal Tunnel Syndrome (CTS) pada Pekerja Pengguna Komputer. Heal Care J Kesehat. 2022;11(2):403–410.

Purwaningsari D. Carpal Tunnel Syndrome (CTS): Literature Review. Lambung Mangkurat Med Semin. 2023;4(1):425–430.

Putra H, Ratnawati D. Hubungan Perilaku Bermain Game Online dengan Carpal Tunnel Syndrome pada Remaja. Fakultas Ilmu Kesehatan, Universitas Pembangunan Nasional Veteran Jakarta. 2020;2(1):1–12.

Rachmahdyanti N. Hubungan Durasi Penggunaan Game Online terhadap Asupan Energi dan Aktivitas Fisik pada Mahasiswa Politeknik Negeri Jember. Published online 2022:1–23.

Sariana E, Bowo Laksono AB. Hubungan karakteristik, riwayat penyakit, dan obesitas dengan keluhan Carpal Tunnel Syndrome (CTS) pada komunitas ojek online wilayah Kecamatan Ciracas, Jakarta Timur tahun 2022. J Untuk Masy Sehat. 2023;7(2):139–148.

Sholikah N, et al. Hubungan antara durasi bermain game online Mobile Legends dengan De Quervain Syndrome. Published online 2020.

Wijaksono H, Eko Wardoyo, Dian Arif Wahyudi. Hubungan Lama Waktu dan Frekuensi Bermain Game Online pada Smartphone dengan Keluhan Carpal Tunnel Syndrome (CTS) pada Mahasiswa Prodi S1 Keperawatan Universitas Aisyah Pringsewu. J Keperawatan Bunda Delima. 2024;6(1).

Wahyuni W, Putra PHB. Hubungan antara Durasi Bermain Game Online dengan Kejadian Carpal Tunnel Syndrome. J Fisioter dan Rehabil. 2023;8(1):104–110.

Wati SL, Endaryanto AH, Sartoyo S, Kusuma WT. Hubungan Durasi Bermain Game Online dengan Risiko Terjadinya Neck Pain pada Generasi Milenial di Perumahan Magersari Indah Mojokerto. J Keperawatan Muhammadiyah. 2023;8(1):20–25.

Widiati N, Yulia L, Fauzan M. Hubungan antara intensitas waktu bermain video game dengan kejadian miopia pada mahasiswa S1 Kedokteran Universitas Batam. Zona Kedokt. 2022;12(3):163–173.

Yafizahran D. Hubungan Lama Waktu dan Frekuensi Bermain Game Online pada Smartphone dengan Keluhan Subjektif Carpal Tunnel Syndrome pada Siswa Kelas XI di SMAN Kota Jambi. Published online 2022.

Zyluk A. The role of genetic factors in the etiology of carpal tunnel syndrome: A review. Adv Clin Exp Med. 2020;29(5):623–628.