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Association of Screen Time and Neck Discomfort and Neck Disability among Adult Population in Malaysia

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Abstract

Prolonged screen time could cause adverse effects, including neck discomfort. During the COVID-19 pandemic, increased use of technological gadgets resulted in the increase of prevalence in neck discomfort. It was pondered upon whether neck pain was due to other lifestyle factors or the increase of screen time in the adult population in Malaysia. This study allows the community to understand whether the duration of screen time is associated with neck discomfort in the population of Malaysian adults. The instruments utilised in this study were sociodemographic index, Neck Disability Index, Numeric Pain Rating Scale and Screen Time Questionnaire. Our results showed that working status had a significant difference on total screen time during

weekdays, weeknights and weekends, and hence also resulting in neck disability. Males had a higher screen time compared to females but do not have a higher tendency for neck disability. Perceived neck discomfort increased exponentially along with the age. Therefore, this study showed that increased duration of screen time may cause both neck discomfort and neck disability.

Keywords – *Screen Time, Musculoskeletal Disorders, COVID -19, Adults, Neck Pain, Neck Disability Index*

INTRODUCTION

Screen time is defined as the activities done in front of a screen, such as working on a computer, playing a video game on mobile phone, or watching a TV program for leisure. (Encyclopedia & children, 2021). Since January 2019, the COVID-19 pandemic has dealt a big blow to the healthcare systems and forced many countries went into a lockdown. Coronavirus disease 2019 (COVID-19) has had a global effect on peoples' lifestyles and accelerated a digital transformation that has been underway for decades. Strict curfews have been implemented. Remote work became more common compared to the last decade. (Shereen et al., 2020). Citizens were stuck at home during this crucial time and some spend time on YouTube, TikTok, Instagram, Netflix, TV, and video games which inevitably increased screen time. The pandemic era has brought citizens on online platforms to continue their daily lives. Screen time has increased in the citizens living in Malaysia, especially ever since the pandemic started. The incidence of musculoskeletal diseases has been frequently reported all around the world. The COVID-19 pandemic era witnessed an increase in the use of electronic media for educational purposes. However, skills learned through digitalised media were limited in comparison with hands-on experience (Linebarger & Walker, 2005). Individuals of all ages were negatively impacted with excess screen time on their schedules (Health, 2021). Musculoskeletal symptoms were quite common especially back, neck and wrist pain (Borhany et al., 2018). In another article studying the student population in Sarawak, Malaysia, a quarter of the students experienced complaints of musculoskeletal discomfort, and 20% experienced behavioural problems associated with the use of electronic devices (Hazana Abdullah et al., 2018).

Neck discomfort is one of the Visual Display Syndrome (VDS) that is gaining importance in this modern era due to the frequent use of technological gadgets. This is the 4th most common musculoskeletal disease that results in a disability in the world. There is limited research on the duration of screen time and the severity of neck discomfort in the adult population in Malaysia.

In the long term, this project aims to reduce neck discomfort in technological gadget users through ergonomically tailored interventions. The question that arises is, is there any association between the duration of the screen time impact neck discomfort among adults living in Malaysia during the COVID-19 pandemic? Or are there any external underlying factors leading to neck discomfort?

The general objective of this study was to investigate prevalence of screen time on digital devices and neck discomfort in the adult population in Malaysia during the pandemic. It is important to find the association between screen time and neck discomfort; at the same time discover the potential activities that may increase risk of neck discomfort. This study allows us to determine the socio-demographic characteristics of the adult population of Malaysians in this study and to investigate if it affects the duration of mean screen time.

METHODOLOGY

Sampling Method

Convenient snowball sampling is used in this study. It is a type of non-probability sampling that involves drawing samples from populations that are closer to obtain for pilot testing. Participants have to fulfil the criteria of being an adult within the age range of 18-60 and are currently living in Malaysia.

Inclusion criteria

- Malaysians from both East and West Malaysia
- Adults between age 18-60 years old
- Can read and comprehend English language

Exclusion criteria

- Patients with existing neck pain
- Patients with visual impairments

Data collection methods

Approval for this study was obtained from the Ethics Committee of Perdana University. The participants who agreed to participate at the beginning of the online questionnaire completed a consent form. The purpose of the study was explained on the front page of the online questionnaire. An image advert with a QR code to recruit participants for the study was designed and circulated on social media platforms such as Facebook, WhatsApp and Instagram. Alternatively, a link was attached to the post containing the image advert. An approval letter was sent to the branch manager of Flexible Automation Sdn Bhd to seek for permission to circulate the online questionnaire within the staff. Approval was provided and the online questionnaire was sent to the employees of the company.

Data analysis

Data collected was analysed using the Statistical Package for the Social Sciences (SPSS) version 24. The analysis focuses on a) Median duration of screen time in adult population across Malaysia; b) Mann-U Whitney test and Phi & Cramer's V Test to compare screen time and neck discomfort between working and non-working adults; c) Mann-U Whitney test and Phi & Cramer V's test to compare screen time and neck discomfort between different genders; d) Kruskal-Wallis ANOVA to compare screen time and neck discomfort between different age groups; e) Pearson Correlation to examine relationship between sociodemographic variables with screen time and neck discomfort among adults in Malaysia. Data was stored securely under password protection only accessible by the team. Social demographic data was accessible by the research team without identifying personal data of respondents.

Results:

Table 1: Distribution of the participants with their demographic characteristics

Variables	Frequency (n)	Percentage (%)
State		
Penang	119	41.2
Selangor	54	18.7
Kuala Lumpur	21	7.3
Johor	10	3.5
Kelantan	7	2.4
Kedah	16	5.5
Sabah	8	2.8
Sarawak	7	2.4
Perlis	7	2.4
Perak	17	5.9
Melaka	7	2.4
Negeri Sembilan	4	1.4
Pahang	1	3

Terengganu	10	3.5
Gender		
Female	186	64.4
Male	102	35.3
Working Status		
Working	182	63
Non-working	106	36.7
Age		
18-30	136	47.1
31-43	34	11.8
44-56	93	32.3
57-69	25	6.7
Race		
Chinese	191	66.3
Malay	59	20.5
Indian	37	12.8
Other	1	.3
Marital status		
Married	106	36.8
Not-married	182	63.2
Income		
<2000	181	62.8
2001-4000	48	16.7
4001-6000	28	9.7
6001-8000	21	7.3
8001-10000	7	2.4
>10001	3	1.0
Education		
PT3	3	1.0
SPM/IGCSE	52	18.1
STPM/A-Level/Diploma	148	51.4
Degree	75	26.0
Master's Degree	9	3.1
PhD	1	.3

Table 2

	Total Screen Time Weekday	**Total Screen Time Weeknight**	**Total Screen Time Weekend**
Median	23.00	18.00	22.00

Median for total screen time for weekdays is 23.00 hours; total screen time for weeknights is 18.00 hours; total screen time weekends is 22.00 hours.

Table 3: Mann-Whitney U Test comparing the screen time, neck discomfort and neck disability between working and non-working adults.

Variables	N	Mean rank	Sum of Rank	Z Value
Total Screen Time Weekday				-2.007
Working	182	152.01	27666.50	
Non-Working	106	131.60	13949.50	
Total	288			
Total Screen Time Weeknight				-2.707
Working	182	154.63	28143.00	
Non-working	106	127.10	13473.00	
Total	288			
Total Screen Time Weekend				-2.244
Working	182	152.90	27828.00	
Non-working	106	130.08	13788.00	
Total	288			

x^2 (1) = 20.056, p = 0.001

A Mann-Whitney U test indicated that the total screen time weekday in the working (*Mean* = 152.01, *n* = 182) population is higher than the non-working population (*Mean* = 131.60, *n* = 131.60), *U* = 8278.500, *z*=-2.007, *p* = 0.045, two-tailed. The total screen time during weeknight in the working population (Mean = 154.63, *n* = 182) is higher than the non-working population (*Mean* = 127.10, *n* = 106), *U* = 7802.000, *z* = -2.707, *p* = 0.045, two-tailed. Total screen time during weekend in the working population (*Mean* = 152.90, n = 182) is higher than the non-working population (*Mean* = 130.08, *n* = 106), *U* = 8117.000, *z* = -2.244, *p* = 0.025. Results show that total screen time in weekday, weeknight and weekend is significant.

Table 4: Chi-Square Test comparing the neck disability with working status

Variables	Value	df	Asymp. Sig (2 sided)
Neck Disability	150.785	4	**.001
Working Status	20.056	1	**.001

Table 5: Phi and Cramer's V Test comparing neck disability with working status

		Value	Approx. Sig.
Nominal by Nominal	Phi	.202	**.019
	Cramer's V	.202	**.019
N of Valid Cases		288	

A Pearson's chi-square test of contingencies with (α=.05) was used to evaluate whether working status is related to neck disability. There is a relationship between neck disability and working status. The chi-square test was statistically significant, $\chi 2$ (4, N=288) = 150.785, p<0.001) when comparing neck disability with working status $\chi 2$ (1, N=288) = 20.056, p<0.001) although the association between neck disability and working status was actually quite small, Φ = .202. The working population were significantly more likely to develop neck disability compared to the non-working population.

Table 6: Mann-Whitney U Test comparing neck discomfort and working status

Variables	N	Mean rank	Sum of Rank
Neck Discomfort			
Working	182	151.34	27543.50
Non-working	106	132.76	14072.50

Total	288		

x^2 (1) = 20.056, p = 0.001

A Mann-Whitney U test indicated that the neck discomfort in participants that were working (*Mean Rank*=151,34, *n*=192) was higher compared to those who were non-working (*Mean Rank* = 132.76, *n* = 106), *U* = 8401.500, *z* = -1.845, *p*=0.065, two-tailed. So, the Mann-Whitney U test shows that working status has no relationship with neck discomfort due to the higher mean rank in employed population.

Table 7: Mann-Whitney U Test comparing gender differences and screen time

Variables	**N**	**Mean rank**	**Sum of rank**	**Z-Value**
Total Screen Time Weekday				-3.683
Female	186	131.12	24388.00	
Male	102	168.90	17228.00	
Total	288			
Total Screen Time Weeknight				-3.588
Female	186	131.47	24453.00	
Male	102	168.26	17163.00	
Total	288			
Total Screen Time Weekend				-3.690
Female	186	131.10	24384.00	
Male	102	168.94	17232.00	
Total	288			
Neck Discomfort				-.491
Female	186	146.27	27205.50	
Male	102	141.28	14410.50	
Total	288			

x^2 (1) = 24.500, *p* = 0.001

A Mann Whitney U test indicated that the total screen time weekday of males (*Mean Rank*=168.90, *n*=102) are higher than that of females (*Mean Rank* =131.12, *n* =186), *U* =6997.000, *z* = -3.683, *p*=0.000230, two-tailed. This indicates that males have a higher total screen time compared to females during the weekdays. The total screen time weeknight of males (Mean Rank=168.26, n=102) are higher than that of females (Mean Rank =131.47, n =186), U =7062.000, z = -3.588, p=0.000333, two-tailed. Males in this study have a higher total screen time during the weeknight as compared to the female population. In the total screen time during the weekends, males (Mean Rank=168.94, n=102) exhibited total screen time that were higher than that of females (Mean Rank =131.10, n =186), U =6993.000, z = -3.690, p=0.000225, two-tailed. Males in this study have a higher total screen time during the weekend than the female population.

However, our findings showed that males (Mean Rank =141.28, n =102) reported lesser neck discomfort compared to the female population (Mean Rank =146.27, n =186), U =9157.500, z = -0.491, p=0.623, two-tailed.

Table 8: Chi-Square Test comparing gender differences with neck disability

Variables	**Value**	**df**	**Asymp. Sig (2 sided)**
Neck Disability	150.785	4	**.001
Gender differences	24.500	1	**.001

Table 9: Phi and Cramer's V Test comparing neck disability with gender

		Value	Approx. Sig.
Nominal by Nominal	Phi	.171	.077
	Cramer's V	.171	.077
N of Valid Cases		288	

A Pearson's chi-square test of contingencies (α=.05) was used to evaluate whether gender differences affect neck disability. There is a relationship between neck disability and working status. The chi-square test was statistically significant, $\chi 2$ (4, N=288) = 150.785, p<0.001) when comparing neck disability with gender differences $\chi 2$ (1, N=288) = 24.500, p<0.001), although the association between neck disability with gender was actually quite small, $\Phi = 0.171$. There is a significant difference in neck disability among different genders. There is a significant difference in gender differences in screen time of weekday, screen time of weeknight and weekend but not in neck discomfort.

Table 10: Kruskal-Wallis ANOVA comparing screen time weekday, screen time weeknight and screen time weekend between age groups

Variables	N	Mean Rank	P-Value
Total Screen Time Weekday			**.001
18-30	136	122.97	
31-43	34	169.24	
44-56	93	167.11	
57-69	25	143.86	
Total	288		
Total Screen Time Weeknight			**.001
18-30	136	122.81	
31-43	34	177.16	
44-56	93	160.75	
57-69	25	157.64	
Total	288		
Total Screen Time Weekend			**.001
18-30	136	121.23	
31-43	34	171.35	
44-56	93		
57-69	25	164.34	
Total	288		

A Kruskal-Wallis ANOVA indicated that there was a statistical difference between the age group 18-30 (Mean rank = 122.97), 31-43 (Mean rank = 169.24), 44-56 (Mean rank = 167.11), 57-69 (Mean rank = 143.86) and total screen time weekday, H= 18.958, df = 3, N= 288, p =. 0.000279, Cohen's f=0.095. It indicates that the population in the age group of 31-43 spends the most screen time during the weekdays. The population that spends the least of the screen time during weekdays is the age group 18-30. For total screen time weeknight, the Kruskal-Wallis ANOVA indicated that there is a statistical difference between the age group 18-30 (Mean rank = 122.81), 31-43 (Mean rank = 177.16), 44-56 (Mean rank = 160.75), 57-69 (Mean rank = 157.64), H (corrected for ties) = 18.646, df = 3, N= 288, p = 0.000324, Cohen's f =0.095. It indicates that the population in the age group of 31-43 spends the most screen time during the weekdays. The population that spends the least of the screen time during weekdays is the age group 18-30. For total screen time weekend, the Kruskal-Wallis

ANOVA indicated that there is a statistical difference between the age group 18-30 (Mean rank = 121.23), 31-43 (Mean rank = 171.35), 44-56 (Mean rank = 163.38), 57-69 (Mean rank = 164.34), H = 20.370, df = 3, N= 288, p = 0.000142, Cohen's f =0.095. It indicates that the population in the age group of 31-43 spends the most screen time during the weekdays. The population that spends the least of the screen time during weekdays is the age group 18-30. Screen time weekday, screen time weeknight and screen time weekend is significant for all age groups.

Table 11: Kruskal-Wallis ANOVA comparing age groups and neck discomfort

Variables	N	Mean Rank	P-Value
Neck Discomfort			
18-30	136	114.11	**.001
31-43	34	153.93	
44-56	93	173.71	
57-69	25	188.34	
Total	288		

x^2 (3) = 113.750, p = 0.001

A Kruskal-Wallis ANOVA indicated that there was a statistical difference, between age group and neck discomfort, with the highest being the age group of 57-69 (Mean Rank = 188.34), followed by the age group of 44-56 (Mean Rank = 173.71), then the age group of 31-43 (Mean Rank= 153.93), and the age group of 57-69 (Mean Rank = 114.11), H = 37.679, df = 3, N= 288, p =3.3051E-8, Cohen's f =0.095. This proves that there is a significant difference between age groups and neck discomfort. The perceived neck discomfort increases along with age.

Table 12: Chi-Square Test comparing age groups with neck disability

Variables	Value	df	Asymp. Sig (2 sided)
Neck Disability	150.785	4	**.001
Age group	113.750	3	**.001

A Pearson's chi-square test of contingencies (α=.05) was used to evaluate whether gender differences affect neck disability. There is a relationship between neck discomfort and age group. The chi-square test was statistically significant, $\chi 2$ (4, N=288) = 150.785, p<0.001) when comparing neck disability with gender differences $\chi 2$ (3, N=288) = 113.750, p<0.001). There is a significant difference when comparing neck discomfort with age group.

Gender is correlated with total screen time in the weekday, weeknight and weekend. Age groups are correlated with neck discomfort, neck disability and total screen times for weekday, weeknight and weekend. State is correlated with neck disability and neck discomfort. Income is correlated with neck discomfort and neck disability. Level of education is positively correlated with neck disability and neck discomfort.

Table 13: Correlation between sociodemographic variables with screen time and neck discomfort

Variables	Neck Disability		Neck Discomfort	
	Correlation (r)	*P value*	Correlation (r)	*P value*
Gender	0.011	0.858	-0.029	0.624
Age group	0.517	**0.000	0.360	**0.000
Working status	0.497	**0.007	-0.109	**0.065

Race	-0.007	0.894	-0.024	0.674
Marriage Status	-0.019	0.745	-0.104	0.075
Income	0.296	**0.001	0.236	**0.001
Education	0.158	**0.007	0.175	**0.002
Total Screen Time Weekday	0.206	**0.001	0.302	**0.001
Total Screen Time Weeknight	0.190	**0.001	0.267	**0.001
Total Screen Time Weekend	0.154	**0.009	0.259	**0.001

Neck disability has positive correlation which is significant with age group, working status, income, education, total screen time for weekdays, weeknights and weekends. Neck discomfort has positive correlation which is significant with age group, working status, income, education, total screen time for weekdays, weeknights and weekends.

DISCUSSION

Screen time is a contributor to neck discomfort and neck disability. Factors that were proven to be associated with neck disability include working status, gender and age. Our research has shown that working status has a relationship with neck disability. Individuals who were working had a higher tendency of having neck discomfort. Women had almost a two-fold risk of getting neck pain compared to men (Cagnie et al., 2006). Age was associated with neck discomfort. Younger participants tend to use their gadgets longer for entertainment and social interaction purposes. Older participants tend to use technological gadgets lesser as their main goal is to get information or to contact someone. Screen time has been between more than 60–80% from before the pandemic (Pandya & Lodha, 2021). However, gender differences and working status were not associated with neck discomfort. Numeric Rating Scale may be underreported and may not serve as a good tool for neck discomfort.

Our research has shown that working status has a relationship with neck disability. Individuals who were working had a higher tendency of having neck discomfort. Another study in Belgium concluded that 45% of 720 office workers complained of neck discomfort and 18.1% of which complaint of continuous pains (Cagnie et al., 2006). This may be due to intensive computer usage as patients are required to work at a stationary work position. This has become a worldwide trend as people are

starting to use technological devices both work and leisure purposes. Office workers may find that neck discomfort will affecting their functionality and effectiveness in daily activities at the work place. Accommodations must be made by the employer to provide opportunities for physical exercise and easy mobilization in the workplace. In Malaysia, Ergonomics was introduced in 1992 however, the level of ergonomic knowledge is still at an early stage due to the limited knowledge. Ergonomic risk factors such as workstation height, high work stress, health hazards, long duration of working hours are contributing factors to neck discomfort (Nath Sen & Yeow, 2003).

Our results also show that males have a higher screen time during weekday, weeknight and weekend compared to females. It is evident that there is a significant difference in neck disability among different genders. However, gender difference is not significantly different when compared to neck discomfort. Females may have a higher tendency to report neck disability and hence seek treatment more often as compared to males. Therefore, males may not report the neck disability until the condition becomes too serious. (Bartley & Fillingim, 2013).

There was a significant difference between all age groups for total screen time in weekday, weeknight and weekend. Perceived neck discomfort increased exponentially along with the age. Gender differences is correlated to total screen time during weekday, weeknight and weekend. Age was correlated with total screen time weekday, weeknight, weekend and neck disability. Patients may have increased total screen time due to

the modernization of 21st century, resulting everything to be done via mobile phones or laptops. On the contrary, this increases tendency of sedentary behaviour for all age groups. This poses as a threat especially to the elderly population. According to a study done by Global Burden of Diseases in 2017, the age group with the highest prevalence of neck pain are those between 45 to 49 years old and 50 to 54 years old. A study done on the Swedish population claimed that women of the working age reported to have more neck pain than older women. (Guez et al., 2002) This may be due to stationary positions that women were forced to maintain at the work place. Small percentage of middle-aged and older adults engage in the recommended amount of regular exercise. Older participants favour physical activity lesser and result in sedentary lifestyles. (Lachman et al., 2022)

In a nutshell, this study showed that increasing screen time duration may cause neck discomfort. Patients may have increased total screen time due to the modernization of 21st century, resulting people to use mobile phones or laptops as an alternative. Increasing screen time may increase the tendency of sedentary behaviour for all age groups.

REFERENCES

1. Bartley, E., & Fillingim, R. (2013). Sex differences in pain: a brief review of clinical and experimental findings. British Journal of Anaesthesia, 111(1), 52-58. https://doi.org/10.1093/bja/aet127
2. Borhany, T., Shahid, E., Siddique, W., & Ali, H. (2018). Musculoskeletal problems in frequent computer and internet users. Journal Of Family Medicine and Primary Care, 7(2), 337. doi: 10.4103/jfmpc.jfmpc_326_17
3. Cagnie, B., Danneels, L., Van Tiggelen, D., De Loose, V., & Cambier, D. (2006). Individual and work-related risk factors for neck pain among office workers: a cross-sectional study. European Spine Journal, 16(5), 679-686. doi: 10.1007/s00586-006-0269-7
4. Encyclopedia, M., & children, S. (2021). Screen time and children: MedlinePlus Medical Encyclopedia. Retrieved 19 July 2021, from https://medlineplus.gov/ency/patientinstructions/000355.htm
5. Guez, M., Hildingsson, C., Nilsson, M., & Toolanen, G. (2002). The prevalence of neck pain. Acta Orthopaedica Scandinavica, 73(4), 455-459. doi: 10.1080/00016470216329
6. Hazana Abdullah, N., Aziati Abdul Hamid, N., Wahab, E., Shamsuddin, A., & Asmawi, R. (2018). Work-related Musculoskeletal Disorder (WRMD) among Production Operators: Studies of Differences in Age and Gender. Journal Of Physics: Conference Series, 1049, 012023. doi: 10.1088/1742-6596/1049/1/012023
7. Health, A. (2021). What are the negative side effects of too much screen time? Retrieved 11 July 2021, from https://www.activehealth.sg/read/screen-time/what-are-the-negative-sideeffects-of-too-much-screen-tim
8. Lachman, M., Lipsitz, L., Lubben, J., Castaneda-Sceppa, C., & Jette, A. (2022). When Adults Don't Exercise: Behavioural Strategies to Increase Physical Activity in Sedentary Middle Aged and Older Adults. Retrieved 12 June 2022, from.
9. Linebarger, D., & Walker, D. (2005). Infants' and Toddlers' Television Viewing and Language Outcomes. American Behavioural Scientist, 48(5), 624-645. doi: 10.1177/0002764204271505
10. Nath Sen, R., & Yeow, P. (2003). Ergonomic Study on the Manual Component Insertion Lines for Occupational Health and Safety Improvements. International Journal of Occupational Safety and Ergonomics, 9(1), 57-74. https://doi.org/10.1080/10803548.2003.11076554
11. Pandya, A., & Lodha, P. (2021). Social Connectedness, Excessive Screen Time During COVID-19 and Mental Health: A Review of Current Evidence. *Frontiers In Human Dynamics*, *3*. doi: 10.3389/fhumd.2021.684137

12. Shereen, M., Khan, S., Kazmi, A., Bashir, N., & Siddique, R. (2020). COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses. Journal Of Advanced Research, 24, 91-98. https://doi.org/10.1016/j.jare.2020.03.005