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## Does the duration of using mobile phone affects neck pain in school students?

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### Abstract

**Introduction:** The most popular portable electronic device in use today is a mobile phone. At least 91% of people worldwide, according to latest estimates, own a mobile phone. Modern information and communication technologies, notably smartphones and mobile devices, have significantly changed people's daily lives, especially those of students. However, there are limited studies conducted on the association of duration of mobile phone used and neck pain in school students.

**Objective:** To determine the duration of using mobile phone and neck pain in school students.

**Methodology:** A cross-sectional study was conducted on 415 subjects (13-17 years old) in school students. A self-administered, internet and intranet mediated questionnaire was created using Google Form and distributed to respondents. The questionnaire is having 3 sections: Section A is demographic data such as age and gender, Section B includes behavioral factors such as duration and posture of using mobile phone, Section C includes the experienced in neck pain and pain scale based on visual analogue scale.

**Results:** Analysis showed that there was significant association between average duration of using mobile phone with neck pain among school students. Spearman correlation test showed moderate correlation which is 0.462 and p value is statistically significant (p value= 0.000) which is <0.05.

**Conclusion:** There was significant association of duration of mobile phone usage and neck pain among school students.

**Key words:** Electronic devices, mobile phone, neck pain, school students, VAS scale etc.

### Introduction

The most popular portable electronic device in use today is a mobile phone. At least 91.04% of people worldwide, according to latest estimates, own a mobile phone. Modern information and communication technologies, notably smartphones and mobile devices, have significantly changed people's daily lives, especially those of school going children's. According to the definition, a cellular phone is "a telephone that has access to a cellular radio system and can be used over long distances without requiring a physical connection to a network." It's amazing that such a little smartphone is based on a mobile computing platform with powerful networking and processing tools. The main reason why mobile phones are becoming more and more popular around the world is because they are a trustworthy form of communication and entertainment (Al-Hadidi *et al.*, 2019) <sup>[1]</sup>. Currently, 32.3 million Malaysians use smartphones, up from only 16.2 million mobile phone subscribers in 2005. More than 200 percent more people now own a handheld gadget, such as a cell phone, than there were ten years ago (Syed Alias *et al.*, 2021) <sup>[3]</sup>. The health, particularly the muscles and nerves, will be impacted by improper mobile phone use, such as prolonged use, incorrect positioning, and dim illumination. Recent decades have seen a rise in the prevalence of neck discomfort, which has serious socioeconomic ramifications for people on their own, in families, communities, and within the healthcare system. According to reports, using a smartphone causes anywhere between 8.2% and 90% of musculoskeletal pain in various body areas. With the neck being the most reported body area to feel pain, 84% of Canadian students who use cellphones reported having musculoskeletal pain (Berolo *et al.*, 2011) <sup>[3]</sup>. According to reports, 71% of patients with musculoskeletal pain in Saudi Arabia have neck and upper extremity discomfort, which is a figure that is comparatively higher than that for Malaysia, Thailand, Nigeria, and Sudan. Lack of neck and upper-limb support while using a smart phone, along with repetitive

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finger movements for testing, can lead to a significant static muscular load, especially when using just one hand. Additionally, utilizing a forward head position when using a smartphone has been linked to an increased risk of developing musculoskeletal pain, increased strain on the cervical structures, and even the potential for neck structure ripping and degeneration. A history of prior neck and shoulder discomfort may also worsen the condition and raise the risk of recurring neck pain. While there is a link between using an electronic device (such as a smartphone) and musculoskeletal symptoms in college students, such as neck pain, there is little data on the impact of the students' demographics (such as their age and gender), whether they have experienced neck pain in the past, and how they use their smartphone, such as how long they spend on it, how many times they type, and how many hands they use to hold it (Gold *et al.*, 2012)<sup>[9]</sup>. The goal of this study was to examine the relationship between neck pain and the duration of mobile phone use.

### Methodology

**Research design:** This quantitative research was conducted in a cross-sectional study with school students. It is more structured and statistical, and it may help you make broad. This broad category of people for whom the researcher hopes to generalize the study's findings is referred to as the "study population." It is also referred to be a clearly defined group of individuals that have common traits (Research Population - The Focus Group of a Scientific Query, 2009). There were 1.92 million secondary pupils registered in 2019, according to the data (Malaysia: public secondary school student number 2019 | Statista, 2021)<sup>[19]</sup>. Convenience sampling, a non-probability sampling technique, has been utilized in this study because, because it involves a close-knit audience, it is easy, quick, and affordable. The minimum suggested sample size for the survey used in this study, as calculated by the Raosoft Sample Size Calculator, is 385 participants.

**Inclusion criteria:** In Malaysia, only healthy secondary school students between the ages of 13 and 17 are recruited. In this study, subjects who possess their own mobile phone and use social media such as WhatsApp and Messenger were also included. Besides, students must understand English to answer the questionnaire for the research purpose.

**Exclusion criteria:** Secondary school students with any musculoskeletal disorders, diseases, or surgeries in the shoulders or neck were prohibited from participating. Students in both primary and university were also not included in this study. Others than that, students who answered the questionnaire after the deadline given was not accepted.

**Ethical Considerations:** The research ethics committee of university (Faculty of Health Sciences) has granted ethical permission for this study. The respondents' identities utilized in this study will be kept private and confidential. The information gathered from respondents is confidential and completely private to guarantee that their data is treated correctly. Research instruments: The respondents will receive the questionnaire, which will serve as the primary tool for collecting data. School students are the target audience for the distribution of self-administered questionnaires. As part of the convenience sample technique, respondents for this survey were randomly selected from the student population at the schools. The primary research tool was chosen since it is

more dependable and contains objective information. Additionally, it gives the data collection process more flexibility. This research has made use of secondary research tools. Utilizing secondary data collecting and literature research, the information was acquired. The International Journal of Care Scholars and Research Gate, two recognized academic sources, provided the data. The indicated factors, such as the duration of time spent on a mobile phone and neck pain, were the main focus of the literature review. To verify the accuracy and validity of the data, more study was done on the variables derived from the literature review using primary data.

### Procedure

**Preparation phase:** Using Google Form, a self-administered, internet and internet-mediated questionnaire was created for this study and given to participants. The questionnaire is divided into three sections. Basic information and demographic data, including gender and age, were to be gathered from the respondents in Section A. Section B cover behavioral factors like the duration of using mobile phone, purposes and posture. Latent variables were crucial in this study. Section C is to indicate whether the student is experiencing neck pain or not. A 10-point Visual Analogue Scale (VAS) was utilized to ask respondents whether they were experiencing any neck pain. A score of 0 indicates no pain, a score of 5 indicates mild pain and a score of 10 indicates the most severe pain.

**Implementation phase:** To make sure that everyone in the sample not only understands the questions, but also understands them in the same way, pilot testing was conducted. Before beginning the main study, it enables the researcher to test the research methodology on a limited number of test subject.

**Data collection phase:** Once the questionnaire is created, there are numerous methods for gathering the data, including postal, delivery, Internet or internet-mediated and collection, interview, and telephone. Online questionnaires will be used as the primary data collection method in this study. The respondents in this study received questionnaires via social media platforms including WhatsApp and messenger.

**Data analysis:** When the data is acquired, it is analyzed using the Statistical Package for Social Sciences (SPSS). From straightforward descriptive statistics to sophisticate multiple regression analysis and visualizations, the software provides a range of statistical methodologies. It is the statistical analysis program that is most frequently used for analyzing, converting, and establishing a recognizable pattern between different data variables.

### Result

A total of 415 subjects were enrolled in this study. There was no subject excluded due to incomplete data or withdrawal. The division of female respondents accounted majority of the sample, which were 233 (56.1%). Whereas, the male respondents were 182 (43.9%). The majority age group who taken this research is 17 years old (28.4%) followed by 15 years old (19.3%). The minority age group is 14 years old as only achieved 15.7% of the students. The mean for age is 15.24 while median is 15 years old. The majority of students used mobile phone (253) compared to laptop (162) and most of the students used mobile phone 7 days in a week (134)

followed by 5 to 6 days (122). There are only 50 students using mobile phone 1 to 2 days in a week and 120 students used mobile phone 3 to 4 hours a day which achieved the highest followed by 5 to 6 hours which achieved 106 students as well only 49 students used mobile phone 8 hours and above a day. The median is 3 which indicates 5-6 hours of mobile phone usage per day. The students felt comfortable using mobile phone in sitting position which achieved 229 students followed by in supine position which achieved 143 students whereas 256 students (61.7%) of the students has experienced neck pain and only 159 students (38.3%) of students does not have experience in neck pain. For both acute and persistent pain, the visual analog scale (VAS) is a validated and subjective measurement was done. Scores are kept by putting a handwritten mark along a 10-cm line that depicts a pain range between "no pain" and "worst pain." 0 is no pain, score 1-3 indicate mild pain, score 4-6 indicate moderate pain and score 7-10 indicate severe pain (Breivika, 2016) [4]. There are 69 students having no neck pain (16.6%), 127 students having mild neck pain (30.5%), 132 students having moderate neck pain (31.8%) and 87 students having severe neck pain (20.9%). The mean result for the VAS scale is 3.91 and median is 4. The standard deviation is 2.983. Whereas 276 students (66.5%) decreased the usage on mobile phone after experiencing neck pain and 32 students (7.7%) students do not decrease the usage of mobile phone after experiencing neck pain. Total 71 students (17.1%) having no neck pain, 247 students (59.5%) having mild neck pain, 80 students (19.2%) students having moderate pain and 17 students (4%) having severe pain after decreasing the usage of mobile phone. The mean result for VAS scale is 2.43 and median is 2. The standard deviation is 1.87. The nonparametric counterpart of the Pearson product-moment correlation is spearman's rank-order correlation. Spearman's correlation coefficient measures the degree and direction of the association between two ranking factors. The spearman correlation can be used when the Pearson correlation's assumptions are clearly violated. Unlike Pearson's correlation, which indicates the strength and direction of your two variables' linear connection, spearman's correlation determines the strength and direction of your two variables' monotonic link (Laerd Statistics, 2018) [11]. The Spearman Rank Correlation can range from +1 to -1, with +1 denoting the ideal rank connection. If a value is 0, there is no correlation between rankings. A complete negative correlation of rank is represented by a value of -1. Correlation between average duration of using mobile phone per day with visual analogue scale (VAS) of neck pain is shown in table 14. Results showed that there was a moderate positive correlation between average duration of using mobile phone per day with VAS of neck pain, which was 0.462. Besides, the p-value was 0.000, thus there was a significant correlation between them. The null hypothesis is rejected.

## Discussion

Based on the most recent statistics, teenagers who are aged between 13-17 years old use their mobile devices on average for 7 hours and 22 minutes every day. Modern human existence is impossible without mobile phones. They have several qualities that appeal to both young and old people. The usage of mobile devices among students has been on the rise. Information on the harmful physical and psychological effects of excessive mobile phone usage is now starting to emerge. According to recent studies, excessive mobile phone use might cause the development of dependency syndrome-

like symptoms. A study has been carried out to study the prevalence of Mobile Phone Dependence (MPD) in secondary school adolescents. A random sample of 415 pupils from Navi Mumbai (India) schools in the 8th, 9th, and 10th levels who had personal mobile phones were included in the study. Age, gender, family structure, phone type, daily usage time, and years of mobile phone use were recorded for participants. Based on the ICD-10 criteria for dependency syndrome, they were given an MPD questionnaire.

## Experienced of neck pain based on visual analogue scale (VAS) among school students

Although neck and shoulder pain are a relatively minor musculoskeletal illness, it has recently become a serious health issue that places a significant cost on both the individual and the community. According to the World Health Organization (WHO), neck discomfort and associated musculoskeletal conditions are the fourth and tenth most common health issues causing years of incapacity. According to the data, neck discomfort affects anything from 0.4 to 86.8% of the global population (Hoy *et al.*, 2010) [10]. Additionally, the Global Burden of Disease Study revealed that among teenagers aged 15 to 19, neck pain is one of the leading causes of years lived with disability. It has a greater prevalence compared to other health issues including asthma, alcoholism, and drug usage. Additionally, some research show that adolescents and teens in impoverished nations are more likely to experience shoulder and neck pain. Based on the data and results collected from the study for students from secondary school, most of the students had experienced neck pain which is 256 students out of 415. For the visual analogue scale, majority of the students having moderate neck pain which achieved 132 out of 415 students (31.8%) and minority of the students having no neck pain which only achieved 69 students (16.6%). As a conclusion for the data collected, more than half of the students that taken the survey have undergone neck pain before due to different factors but most of them believed that neck pain is related to the mobile phone usage.

## Association of average duration of using mobile phone with neck pain

A study has been carried out by Öğrenci *et al.* to find out the effect of technological devices on cervical lordosis. 156 individuals who applied between 2013 and 2016 with only neck pain and no other issues were considered. Patients are asked directly about their use of smartphones, tablets, and other gadgets. The total consumption value was established as the result of multiplying the year of usage by the usual daily usage. Statistics were used to compare the cervical lordosis angles with the overall amount of usage. The cut-off value for the general ROC analysis was shown to be 20.5 hy. When the cut-off value is tested, 72.4% of the time, the accuracy is extremely excellent. True risk and non-risk estimates are very high. It is statistically significant to do the ROC analysis (Öğrenci *et al.*, 2018) [17].

## Strengths and limitations

The novelty of this study is one of its strengths. To the best of our knowledge, no research has been done to look at how average duration of using mobile phone affects neck pain in Malaysia school students. Furthermore, visual analogue scale (VAS) was used to further access the severity of pain among school students. Additionally, the length of data collection was acceptable and didn't put too much pressure on the individuals. However, there are limitations in this study. A

cross-sectional study is one that gathers data from a population at a single moment in time without contributing to the explanation of cause and effect. In addition, the subjects were also solely chosen from one of the secondary school students. As a result, it may not accurately reflect the secondary school student's population in other parts of Malaysia. Another limitation is the usage of other electronic devices (such as laptops) or even the posture of using mobile phone was not taken into consideration. Lastly, the questionnaire was also restricted to secondary school students their age and only included those who use social media, making it difficult for this study to compare the pain characteristics of other age groups.

### Limitation of study

Since the limitation of this study is the population and sample size, so future large-scale studies could be done on similar research towards the different school students in other places or states in Malaysia to represent the population better.

### Conclusion

This study attempted to determine the association of average duration of using mobile phone with neck pain among school students. Many studies have been conducted in Chapter 1.5, literature review. On top of that, to determine the association between each independent variable and dependent variable, several analyses were carried out. As in Pearson Chi Square test, the result showed that the variable tested have a positive relationship between one another. For Spearman Correlation test, the result showed statistically significant because the  $p$  value was equal to 0.000. As a general rule, the impact of the independent factors on the dependent variable is significant if  $P \leq 0.05$ . In conclusion, there was significant association of average duration of mobile phone usage with neck pain among school students. As a result, the null hypothesis is rejected.

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**Conflict of interest:** NIL.

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