# A Correlational Study Between Electronic Screen Exposure and the Frequency and Severity of Migraine Among Medicine Students of the University of Santo Tomas, Faculty of Medicine and Surgery in Manila under Online Distant Learning in AY 2022-2023

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## ABSTRACT

**Introduction:** Virtual learning is the new normal brought about by the pandemic in the field of education. Consequently, students are compelled to have increased exposure to electronic screens. With digital eye strain caused by increased exposure to gadgets, this study will look for a correlation between exposure to electronic screens and the severity and frequency of headaches and migraines among students studying online.

**Objective:** This study aims to gain an understanding of the average exposure of students to electronic screens and if there is a high frequency of migraine due to this increased exposure so that school administrators are aware of this; and in turn, to serve as a stepping stone for future studies in the same field of research.

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**Methodology:** This study will make use of an observational comparative design also known as a cross-sectional descriptive study in order to look into the proportion of students affected by such a phenomenon at one point in time. The chosen study population will consist of medicine students currently enrolled in the University of Santo Tomas, Faculty of Medicine and Surgery. The study will make use of questionnaires in order to gather data from the sample population.

**Results:** Our research study indicates a significant direct correlation as evidenced by both the Pearson correlation coefficient of 0.386 and the p-value of 0.050 between electronic screen exposure and migraine frequency/severity among UST medicine students engaged in online distance learning.

While this correlation underscores the potential health impact of prolonged screen time, the moderately low association suggests a need for cautious interpretation. Other factors explored, such as gender and year level, exhibited positive correlations of 0.283 and 2.955, respectively, but did not reach statistical significance, possibly due to the small sample size limiting the depth of analysis.

**Conclusion:** Our study highlights a significant correlation between screen time exposure and migraine severity, suggesting the need for schools adopting online or hybrid setups to consider screen hours in their policies. Given the emergence of online learning environments, these factors require careful consideration. While exploring additional factors like gender and year level, limited sample size hindered conclusive findings. Future research should focus on increasing sample size and investigating variables such as screen time quality, exposure environment and participant demographics to better understand the primary causes predisposing individuals to migraine without aura.

**Keywords:** Migraine, Online Distant Learning, Electronic Screen Exposure

## INTRODUCTION

With the dawn of an atypical situation brought by the pandemic in the field of education, students are compelled to follow a new kind of system for learning. At that time, enriched virtual mode was integrated. With that, the number of hours that students are in front of a screen drastically increased compared to the time before there was a pandemic. Consequently, it increased the prevalence of headaches and migraines caused by digital eye strain from increased exposure to gadgets.

The researchers chose this topic because it was important that they address this problem since this was something that was new for everyone. Viewing recorded lectures during asynchronous and synchronous activities increases the chances for digital eye strain that could lead to migraine. Knowing the high prevalence of migraine can assist school administrators to come up with alternatives that would lessen screen time of students without compromising the true essence of learning. Among other reasons, it helps spread awareness to the general public that with prolonged exposure to gadgets, may be for work or leisure, there is the need to limit the time that people are in front of these screens.

In a study by Montagni, et.al.,[1] 4927 participants were evaluated with the association between screen time exposure and headache status. They found an association that was somewhat stronger for migraine without aura; however, they found no significance between screen time exposure and non-migraine headache. Participants had a mean age of 20.8 years and 75.5% were female. The multivariable model showed that students in the highest screen time exposure quintile had increased risk for migraine. High levels of screen time exposure are associated with migraine in young adults. No significant association was found with non-migraine headaches.

Genetic predisposition, physical activity, loud noises and hot climates have been identified as potential migraine triggers. Among 159 children studied, the highest migraine prevalence (17.5%) was observed in 13-year-olds. These findings suggest that social, familial, environmental and psychological factors may also contribute to migraine development.[2]

The definition and recognition of migraine can vary significantly depending on an individual's medical expertise. A recent study by Yeh, et.al.[3] surveyed 606 participants, categorizing them into neurologists and non-neurologists to assess the prevalence of migraine. The results revealed that 2.6% to 21.7% of non-neurologists reported experiencing migraine, while 27.6% to 48.6% of neurologists identified themselves as migraine sufferers. This discrepancy suggests that non-neurologists may under-

recognize migraine symptoms, potentially leading to underreporting and misdiagnosis in the general population. These findings highlight the importance of proper migraine awareness and education, especially among non-specialists, to ensure accurate diagnosis and effective management.

According to a study by Torsheim, et.al.,[4] a factor that may come about physical complaints in adolescents may be due to prolonged screen time because of screen time activities. This study used a cross-sectional approach to examine the relationship between screen-based activities and physical complaints (backache and headache) among 31,022 adolescents from Denmark, Sweden, Norway, Finland, Iceland and Greenland. The research was part of the 2005/06 Health Behavior in School-aged Children (HBSC) study. Daily hours spent on screen-based activities and levels of physical complaints were assessed using self-reports. The results indicated that computer use, computer gaming and TV viewing contribute uniquely to the prediction of weekly backache and headaches. Screen-based activities have been identified as a contributing factor to physical complaints, including headaches, among young people, with their effects accumulating across different types of screen use. A large-scale analysis by Wöber-Bingöl (2013),[5] which reviewed 64 cross-sectional studies across 32 countries involving 227,249 subjects, found that the mean prevalence of headaches was 54.4% (95% CI 43.1-65.8), while migraines specifically had a mean prevalence of 9.1% (95% CI 7.1-11.1). However, there remains a lack of population-based studies from low- and middle-income countries, with limited data on probable migraine, chronic migraine and menstrual migraine in younger populations. These gaps highlight the need for further research to fully understand migraine prevalence and its influencing factors.

In a cross-sectional comparative study by Demir, et.al.,[6] there is a correlation between overuse of smartphones, headache duration and frequency, sleep quality and daytime sleepiness. It was concluded that increase in smartphone use results in increased headache duration and frequency, and daytime sleepiness. Consequently, it decreased sleep quality and even quality of life. In this study, a total of 123 patients were selected. The materials used in this research were the use of migraine disability assessment (MIDAS) questionnaire to evaluate the disability status and Mobile Phone Problematic Use Scale (MPPUS) to evaluate smartphone use frequency. The Visual Analogue Scale (VAS), 24-h Migraine Quality of Life Questionnaire (24-h MQoLQ), Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) were used to evaluate the pain intensity, quality of life, sleep quality and daytime sleepiness. As a result, there was significant difference between the groups in terms of pain intensity, frequency and duration as well as VAS, PSQI, 24-h MQoLQ and ESS (p less than 0.05) scores. There was a negative correlation between MPPUS and PSQI ($r = -0.367$, p less than 0.05); a strong positive correlation between MPPUS and ESS ($r = 0.675$, p less than 0.05) and a negative correlation between MPPUS and 24-h MQoLQ ($r = -0.508$, p less than 0.05).

Multiple studies have explored the prevalence of migraine across different populations, revealing significant variations based on age, gender and environmental factors. A study[3] conducted among schoolchildren in the United Arab Emirates found that 36.9% experienced headaches, with 13.7% classified as migraines. The prevalence of headaches increased with age, peaking at 17.5% in 13-year-olds. Similarly, a study by Abu-Arefeh, et.al.,[7] conducted among 2,165 schoolchildren in Aberdeen, reported a 10.6% prevalence of migraine, with 7.8% classified as migraine without aura. A broader meta-analysis[5] of 64 cross-sectional studies across 32 countries, including 227,249 subjects, estimated the mean migraine prevalence at 9.1% (95% CI 7.1-11.1), with headaches affecting 54.4% of the population. However, it highlighted a lack of data from low- and middle-income countries, particularly regarding chronic and menstrual migraine in young populations.

In addition to migraine prevalence, studies have also identified prolonged screen exposure as a significant contributing factor to headaches and migraines. A large-scale study[1] involving 4,927 young adults demonstrated a correlation between screen time and migraine, particularly migraine without aura, but found no significant association with non-migraine headaches. Another study[4] involving 31,022 adolescents from Nordic countries found that time spent on screen-based activities was strongly associated with weekly headaches. Moreover, a study by Demir, et.al. [6] analyzing 123 migraine patients using tools such as the MIDAS, the MPPUS

and the PSQI found that excessive smartphone use increased headache duration, reduced sleep quality and worsened quality of life. The study reported a negative correlation between MPPUS and PSQI ($r = -0.367$, $p<0.05$), a positive correlation between MPPUS and daytime sleepiness ($r = 0.675$, $p<0.05$) and a negative correlation between MPPUS and 24-h Migraine Quality of Life Questionnaire ($r = -0.508$, $p<0.05$).

Collectively, these findings emphasize that screen time is a modifiable risk factor for migraine, particularly in digital-heavy environments such as online learning. The direct correlation between prolonged electronic screen exposure and increased migraine frequency/severity underscores the need for preventive measures, such as screen time regulation, ergonomic adjustments and increased awareness to mitigate the impact of migraines in affected individuals.

It is important to establish the reliability and validity of tools used in research to ensure accurate and meaningful results. One such tool is the MIDAS Questionnaire, which is designed to measure the impact of migraines on daily activities. The MIDAS Questionnaire consists of five key questions that assess the number of days, within the past three months, that a migraine sufferer has experienced activity limitations due to headaches. These limitations include work-related tasks, household responsibilities and social activities.

A study[8] titled "Development and Testing of the Migraine Disability Assessment (MIDAS) Questionnaire to Assess Headache-Related Disability" examined the reliability and validity of this tool. The study involved 49 physicians who used the MIDAS questionnaire to evaluate its effectiveness in assessing headache-related disability. The findings demonstrated that the MIDAS Questionnaire was internally consistent, highly reliable, and valid, correlating strongly with physicians' clinical judgments. These results highlight its suitability for use in both clinical practice and research. Additionally, the MIDAS Questionnaire enhances physician-patient communication regarding migraine-related disability, thereby contributing to improved healthcare delivery for migraine sufferers.

The International Headache Society (2013)[9] categorized migraine into two major subtypes, migraine without aura, which is a clinical syndrome characterized by headache with specific features and associated symptoms and migraine, which is primarily characterized by transient focal neurological symptoms that usually precede or sometimes accompany headache. Another independent category included is probable migraine, which is coded as the former in accordance with the general rule that a definite diagnosis always trumps a probable diagnosis.

Migraine without aura is a recurrent headache disorder that lasts for 4-72 hours. To categorize an individual in the first category (migraine without aura), a recurrent headache disorder of at least five attacks should fulfill the following diagnostic criteria. The first criteria is that when headache attacks last 4-72 hours whether untreated or unsuccessfully treated. Second, when it has at least two of the following four characteristics: 1) Unilateral location, 2) Pulsating activity, 3) Moderate or severe pain intensity, 4) Aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs). Third, is when during headache, at least one of the following should be met: 1) Nausea and/or vomiting, 2) Photophobia and phonobia. Lastly, these diagnostic criteria are not better accounted for by other ICHD-3 diagnoses. At least five attacks are required because few migraine attacks may be difficult to distinguish from symptomatic migraine-like attacks. The nature of a single or few attacks are also difficult to understand.

Probable migraine is a migraine-like attack that lacks one of the features required to fulfill all criteria for the previously mentioned subtypes of migraine. It should not also fulfill the criteria for another headache disorder. To classify probable migraine without aura, the diagnostic criteria that should be fulfilled must include the following: A. Attacks fulfilling all but one of the criteria 1-4 in migraine without aura. B. Not fulfilling ICHD-3 criteria for any other headache disorder and C. Not better accounted for by another ICHD-3 diagnosis. To classify a probable migraine, the diagnostic criteria to be fulfilled include: A. Attacks fulfilling all but one of the criteria A–C for migraine or any of its subforms, B. Not fulfilling ICHD-3 criteria for any other headache disorder, C. Not better accounted for by another ICHD-3 diagnosis.

As for the average amount of hours of electronic usage in which possible adverse health effects may be observed, studies like one conducted by Liu, et.al.[10] say that "children who use gadgets for more than 2 hours per day have an increased risk of depression, and that risk increases with increasing screen time". Another study by Kardefelt-Winther[11] observed an association between the "duration of playing gadgets with feelings of depression and delinquency in children when playing gadgets for more than 6 hours per day". Similarly, another study stated a similar conclusion stating that depression was found to be significantly higher among females. Their results also showed that moderate or severe depression level was associated with higher time spent on TV watching and use of computers, which is more than 6 hours a day.[12]

In another study conducted by Parent, et.al.,[13] it was discovered that "sleep duration appears to decrease progressively after 4 or 6 hours of daily screen time for preadolescents. As both duration and quality of sleep are important for children and adolescents, the findings suggest that for preadolescents screen time above 4 to 6 hours daily is disruptive and for adolescents screen time above 10 hours daily is disruptive". They also claim that with the limited amount of sleep, higher levels of screen time can disrupt functioning in other areas such as academic performance.

With this in mind, the study aims to find if there is a significant association between increased exposure to electronic screens and frequency of migraine among students studying online. Similarly, the study aims to look into the correlation between exposure to the screen from gadgets and frequency and severity of headaches and migraine from students undergoing online distant learning; along with the frequency and severity of migraines using specific tools like the migraine screening questionnaire and MIDAS questionnaire.

## METHODOLOGY

### Study Design

The research problem aims to determine the severity and frequency of migraine in students taking online classes and its relation to the length of exposure to electronic screens. The most appropriate design for this study would be to conduct an observational comparative study also known as cross-sectional descriptive study in order to look into the proportion of students affected by such a phenomenon at one

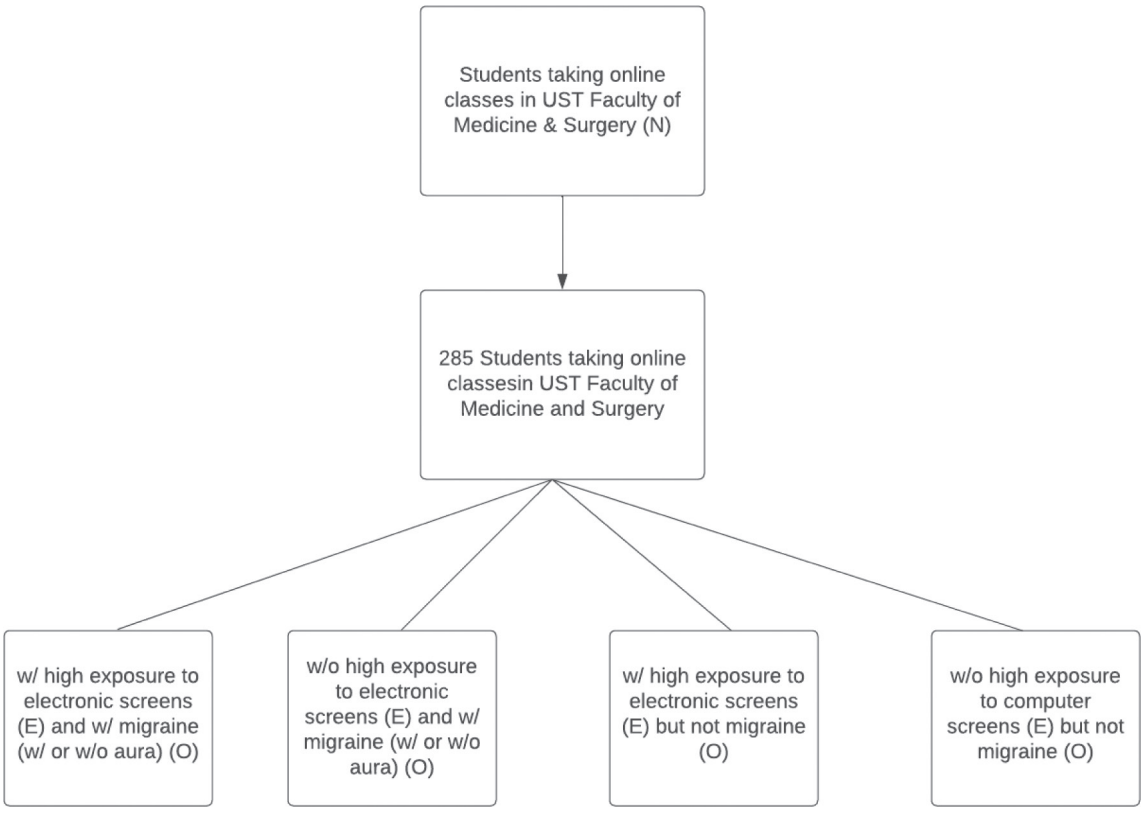


**Figure 1:** Observational Comparative (Cross-Sectional Study)

**Table 1:** Inclusion and Exclusion Criteria

| Inclusion Criteria | Exclusion Criteria |
|---|---|
| • Medicine students:<br>◦ currently enrolled in UST<br>◦ currently taking online classes (school year 2021-2022)<br>◦ exposure to electronic screens<br>◦ with or without migraine | • Refusal to give informed consent<br>• Any acute or chronic condition that will limit the ability of the student to participate in the study<br>• Medicine students who are not currently enrolled in UST<br>• Chronic migraine<br>• Episodic syndromes which may be associated with migraine |

point in time. The study will look into four categories as shown above, wherein high exposure will pertain to respondents falling into a specific amount of hours spent on electronic screens which will be determined by the academic load of the student.

## Setting

The chosen study population consists of medicine students currently enrolled in the University of Santo Tomas, Faculty of Medicine and Surgery. The researchers will use the university email given by the institution as a means of contacting and gathering data from its respondents. Online questionnaires will be sent through their emails.

## Participants

The study population is asked to self-report their average screen time exposure both meant for study and leisure, which is then categorized by the researchers as ''low,'', "moderate" and ''high" - time scale of each category will be analyzed and distributed equally based on results of the screen time exposure questionnaires. Presence of headaches - categorized as "non-migraine headache", "migraine without aura" will also be analyzed using a baseline questionnaire, the ICHD by the International Headache Society as a reference.

## Variables

**Independent Variable:** Electronic Screen Exposure
**Dependent Variable:** Frequency and Severity of Migraine
**Confounding Variable:** Age, Year level

## Data Sources/Measurement

A survey questionnaire was used since the goal of research focused on frequency of the dependent variable occurring in the sample size. Primary and quantitative data using obtrusive methods were done. The data itself was obtained straight from the source (ie, the respondents) and is mostly quantitative in nature since we dealt with data in numerical form with a little bit of self-reported data. The questionnaire followed a structured approach to better compare data from different large clusters and show results numerically. Triangulation of methods as a means to increase the accuracy of data were done.

## Study Size

The sampling design used for this study was a simple random sampling technique. It is the most appropriate probability sampling design for this study as it aims to further specify the population of subjects that the group is targeting more so than just doing a simple random sampling technique. The target population were medicine students and we will be looking into whether the difference in year levels would also contribute or affect outcomes of the study. To avoid large discrepancies with regard to population size of each stratum, a weighted representation shall be taken from the strata.

To account for bias, which we perceive to be Recall Bias, the researchers plan to generate appropriately worded survey questions in order to help avoid errors in data. The structured questionnaires will be sent to the respondent via their university emails to ensure that everyone will have an equal chance to participate in the study. This will then be given to them in the form of a Gform wherein they will be asked to evaluate their overall health status in the previous online school year by reporting their

| Sample Size for % Frequency in a Population (Random Sample) | | |
|---|---|---|
| Population size | 1100 | If large, leave as one million |
| Anticipated % frequency(p) | 50 | Between 0 & 99.99. If unknown, use 50% |
| Confidence limits as +/- percent of 100 | 5 | Absolute precision % |
| Design effect (for complex sample surveys--DEFF) | 1 | 1.0 for random sample |

**Figure 2:** Sample size % frequency in a population

**Sample Size for Frequency in a Population**

Population size(for finite population correction factor or fpc)(*N*): 1100
Hypothesized % frequency of outcome factor in the population (*p*): 50%+/-5
Confidence limits as % of 100(absolute +/- %)(*d*): 5%
Design effect (for cluster surveys-*DEFF*): 1

**Sample Size(*n*) for Various Confidence Levels**

| ConfidenceLevel(%) | Sample Size |
|---|---|
| 95% | 285 |
| 80% | 144 |
| 90% | 218 |
| 97% | 330 |
| 99% | 415 |
| 99.9% | 546 |
| 99.99% | 638 |

**Figure 3:** Sample size % frequency in a population with different confidence level

signs and symptoms along with their average screen time exposure for easier analysis of data. Diagnosis of headache subtypes was then interpreted by the researchers themselves using the ICHD-3 guidelines.

For the calculation of sample size of this study, the type of formula that will be used for the research was first identified. Then the use of an online tool kit with the link of: (http://openepi.com/SampleSize/SSPropor.htm ) was utilized in order to accurately solve for our sample size. The population size used in the tool was based on the college from which our population will be based upon which are the students from the Faculty of Medicine and Surgery. The anticipated frequency was then set to 50% and the confidence limit to 5%. As for the design effect, it was left at 1 to indicate a random sample. According to results from the online toolkit, the population size would be at 1100 students and the sample size that will be used is at 285, which would be the minimum number of participants needed to partake in research. It also should be noted that the sample size followed will be the one in the 95% confidence level.

### Quantitative Variables

As mentioned in the Data Sources and Measurement part, the quantitative variables were obtained through obtrusive methods. The data needed was grouped into the following: A.) Headache Classification; B.) MIDAS and Screen Time Association; C.) MIDAS and Year Level Association; and D.) MIDAS and Gender Association. All of these were subjected to statistical analysis to determine the significance of data collected. A big part of the objectives of this study was to correlate screen exposure duration to the severity and frequency of migraines, which is why researchers clustered data in a way that relates the measuring tool of severity (MIDAS) to the different variables that are considered to be factors to the presence or absence of migraines among participants.

### Statistical Methods

The statistical methods employed include correlation analysis and cross-tabulation (chi-square) for categorical variables. A bivariate Pearson correlation was used as a statistical method to assess the linear relationship between participants' MIDAS score and screen time exposure. Significance testing was performed with a two-tailed test and the significance level was set at (0.05). Descriptive statistics were provided for MIDAS score and screen time in hours. The analyses presented in our output do not explicitly control for confounding variables.

A statistical analysis was also used to examine subgroups and interactions among the MIDAS scores with year level and gender. For the MIDAS score and year-level correlation, three chi-square tests were performed: Pearson Chi-Square, Likelihood Ratio and Linear-by-Linear Association. These tests were used to assess the association between two variables. For the MIDAS score and gender correlation, a Pearson chi-square test was performed to assess the association between the two variables. For both crosstabs, chi-square tests were used to evaluate whether there was a statistically significant association between variables. Significance levels (P values) were reported, and the significance level was set at 0.05.

In both the correlation and cross-tabulation (chi-square) analyses, missing data were addressed using the "PAIRWISE" option. This option ensured that the analyses considered all available pairs of cases with valid data for the specified variables, excluding cases with missing values in either variable from the calculations. The correlation analysis examined the relationship between MIDAS and screen time, with a focus on significant associations. The cross-tabulation analysis explored associations between MIDAS, Year Level and Gender, with the "COUNT ROUND CELL" option providing counts for each cell in the resulting tables. The handling of missing data involved excluding cases with missing values for the specified variables, aligning with the "PAIRWISE" approach in both analyses.

### Institutional Review Board Approval

The UST-FMS Research Ethics Board has approved our application submission with version 1 documents, acknowledging our responsibilities as investigators to adhere strictly to the approved research protocol and informed consent forms, comply with relevant guidelines and regulations, and report any non-compliance or deviations. The clearance remains valid until December 5, 2023, with a reminder to apply for continuing review 4-6 weeks before expiry. Informed consent was obtained electronically through Google Forms. The consent form was presented at the beginning of the survey, detailing the study's purpose, procedures, risks and confidentiality protections. Participants were required to read the information and indicate their consent by clicking the agreement checkbox before proceeding to answer the questionnaire. All collected data were kept confidential, stored securely and used solely for the purposes stated in the approved research protocol.

## RESULTS

### Participants

**Table 2:** Headache classification of study participants

| Classification | Total Sample *(n = 227)* |
|---|---|
| No headache | 36 (15.86%) |
| Headache | 165 (72.69%) |
| Migraine w/o Aura (total) | 26 (11.45%) |
| Migraine w/o Aura (4-14 days a month) | 24 (10.57%) |
| Migraine w/o Aura (more than 14 days a month) | 2 (0.88%) |

### Descriptive Data

The study participants consisted of medicine school students currently enrolled at the University of Santo Tomas, Faculty of Medicine and Surgery. Those included in the study are students who underwent online learning/classes, especially who were enrolled in the years 2021-2022 due to university guidelines of implementing a full online course throughout the year without the possibility of hybrid or face-to-face classes. The exposures of such participants necessitate the use of electronic gadgets for learning throughout the day and with that being the inclusion of experiencing migraine as a result of prolonged exposure and usage of such.

Out of the 227 participants who answered the questionnaire, only 191 experienced migraine or headache and 26 of those experienced migraine without aura, which were further classified due to the frequency of experiencing migraine without aura.

### Outcome Data

**Table 3:** MIDAS (Migraine Disability Assessment) Questionnaire Interpretation and the Association between MIDAS and Screen Time

| MIDAS Grade | Definition | MIDAS Score |
|---|---|---|
| I | Little or No Disability | 0-5 |
| II | Mild Disability | 6-10 |
| III | Moderate Disability | 11-20 |
| IV | Severe Disability | 21+ |

| | Mean | Standard Deviation | Pearson r | P-value | Significance |
|---|---|---|---|---|---|
| **MIDAS** | 16.4231 | 16.47586 | 0.386 | 0.050* | Significant |
| **Screen Time** | 114.7308 | 63.00892 | | | |

**Table 4:** Association between MIDAS and Year Level and its Statistical Analysis

| MIDAS Classification | Year Level | | | | Total |
|---|---|---|---|---|---|
| | 1st Year | 2nd Year | 3rd Year | Clerk | |
| **Migraine w/o Aura (4-14 days a month)** | 8 | 9 | 5 | 2 | 24 |
| **Migraine w/o Aura (more than 14 days a month)** | 0 | 2 | 0 | 0 | 2 |
| **Total** | 8 | 11 | 5 | 2 | 26 |

| Pearson Chi-Square | P-Value | Significance |
|---|---|---|
| 2.955 | 0.399 | Not significant |

**Table 5:** Association between MIDAS and Gender and its Statistical Analysis

| MIDAS Classification | Gender | | Total |
|---|---|---|---|
| | Male | Female | |
| **Migraine w/o Aura (4-14 days a month)** | 3 | 21 | 24 |
| **Migraine w/o Aura (more than 14 days a month)** | 0 | 2 | 2 |
| **Total** | 3 | 23 | 26 |

| Pearson Chi-Square | P-Value | Significance |
|---|---|---|
| 0.283 | 0.776 | Not significant |

## DISCUSSION

From the dataset provided, it appears that out of the total sample size of 227 individuals, 36 participants reported no headaches and 165 participants experienced headaches of varying types. Among those with headaches, a subset of 26 individuals reported experiencing migraines without aura. Within this subset of migraine sufferers, 24 individuals experienced migraines between 4 to 14 days per month, while only 2 individuals experienced migraines more than 14 days a month without aura.

This data showcases a significant prevalence of headaches among the sample group, with a notable proportion experiencing migraines specifically without aura. The majority of migraine sufferers experienced episodes within a moderate range of 4 to 14 days per month, while a small minority reported more frequent occurrences exceeding 14 days monthly.

Understanding the frequency and categorization of migraines within the sample population could be crucial for further analysis and implications in terms of management or intervention strategies for migraine-prone individuals within this demographic.

The Migraine Disability Questionnaire or MIDAS was used in our study to determine the severity and frequency of migraine the students are experiencing. The interpretation of the MIDAS score was graded using the MIDAS Grade System which is as follows: A score of 0-5 corresponds to little or no disability, 6-10 for mild disability, 11-20 for moderate disability and lastly a score of more than 21 will indicate severe disability. In our study, with figures found in Table 2, the mean MIDAS score is 16.42, which means that the MIDAS Grade is moderate disability.

There was a significant direct relationship between screen time exposure and severity of migraine. As screen time increases, the MIDAS level also increases. This is evident due to the P value of 0.050, rendering the study significant. Pearson correlation is a statistical measure that quantifies the strength and direction of a linear relationship between two variables. If the Pearson correlation is close to 1, it suggests a strong linear relationship. In our study, the Pearson correlation is 0.386, which means that there is a moderately low association due to the limited number of respondents. However, the results are still deemed significant. In a study conducted by Montagni, et.al.,[1] it was also stated that there was a significant direct correlation between screen time exposure such as computers, tablets, smartphones and televisions, and migraine among young people.

Upon using the MIDAS questionnaire, as the sample population was chosen, we have incorporated the different year levels of medical students to determine if there is a correlation with increase in migraine prevalence as the year level rises due to the possibility of increased workload or increased level of screen time. This was well supported by existing literature that suggested that an increase in screen time can cause incidences of migraine headaches and could subsequently even affect one's academic performance. According to Montagni, et.al.,[1] there was a relevant relationship between prolonged screen time and migraine headaches.

Our study showed that there was a direct relationship between prolonged screen time and the prevalence of migraine headaches. The Pearson value showed a positive result showing that it was significant but also deemed the study to have a moderately low association. It is imperative to note that we cannot make a final conclusion in our study due to the lack of numbers of our sample population, in comparison to other literature that brought about similar objectives of finding a correlation between prolonged screen time and migraine headaches. These literature sample population has reached thousands which can conclude its direct relationship with the use of statistical studies to compare with our population of 26. Although multiple literatures suggest the relation between prolonged screen time and prevalence of migraine headaches, perhaps in the future, conducted studies regarding the same topic should show importance in increasing their target population so as to show significance in statistical analyses.

In our study, we separated the male and female genders and tabulated the results respectively to explore potential correlations with migraines, prompted by findings in existing literature. Notably, a study by Buse, et.al.,[14] highlighted that one of the hallmarks of migraine was the female population having more prevalence compared to the males. In a study by Pavlović, et.al.,[15] it stated that migraine was linked to sex hormones and that migraine poses a significant burden, especially in the reproductive years. In their study entitled, "Sex hormones in women with and without migraine", they state that hormones, especially estrogen, play a significant role

in migraine development. In an article by Ahmad SR,[16] it was stated that fluctuations in estrogen levels, eg, estrogen withdrawal, such as those that occur during the menstrual cycle can trigger or influence migraines. Although our study identified an association between gender and migraines, the Pearson correlation was not statistically significant due to a limited number of respondents, hindering a more robust analysis.

Several studies have associated migraines with gender and level of screen time exposure. Pavlović, et.al.[15] compared daily sex hormone levels and rates of change between women with a history of migraine and controls. It was concluded that migraineurs are characterized by faster late luteal phase E1c decline compared to controls. According to a study by Rossi, et.al.,[17] entitled "Sex and Gender differences in migraines: A narrative review", migraines in women are more prevalent compared to men because of hormonal differences, as well as differences in brain structure, genetic polymorphisms and neuronal pathways. In an article by Ahmad, et.al.,[16] it was stated that migraine pathophysiology was influenced by sex hormones, especially estrogen. In a study conducted by Montagni, et.al.,[1] the multivariable model showed that students in the highest screen time exposure quintile had an increased risk for migraine. Results showed that high levels of screen time exposure was associated with migraine in young adults. Participants had a mean age of 20.8 years and 75.5% were female. The results showed that there was a correlation between prolonged screen time and migraine but also showed specific results that that there was a stronger correlation for migraine without aura.

## Limitations

As for future research, our group looked into other parameters such as gender and year level in hopes of finding other factors that may play a role in predisposing one to have migraine. However, a lack of numbers was what ultimately prevented the group from drawing out any meaningful conclusions from these data sets. Another limitation that was encountered by researchers was the limited amount of students that we could survey further leading to a smaller subset of the population that fit our requirements to be further studied. With this in mind, for future research, we advise an increase in sample size and to further extend the scope of the study be it to include other students from the university, or to include other medical schools with similar setups; however, other factors should also be taken into account as possible confounding factors. Lastly, the group was only able to pinpoint a limited amount of confounding variables which could be expounded upon in future studies. Other variables were the quality of screen time exposure (eg, if continuous exposure or interrupted), the environment of screen time exposure (eg, distance from the gadget, amount of light in surrounding areas) and the demographic of participants themselves (eg, habit with screen time usage, wearing eyeglasses). By adding more variables and a larger amount of sample size, we hope to exhaust most if not all of the primary causes which predispose an individual to develop migraine without aura.

## Interpretation

In summary, our research study has found that the amount of exposure to electronic screens has a significant direct correlation with the frequency and severity of migraine in UST medicine students engaged in online distance learning as evidenced by the Pearson correlation coefficient of 0.386 and a p-value of 0.050 when analyzing the MIDAS score and screen time exposure. The observed positive correlation between MIDAS scores and screen time suggests a noteworthy relationship, however, the moderately low association highlights the need for caution in interpretation. Overall, the study's findings emphasize the importance of considering potential health implications of prolonged screen time in an online academic setting.

Regarding other factors that we have explored such as the gender and year level of students, although there was an association as shown by the positive Pearson correlation coefficient of 0.283 and 2.955 respectively, they still did not reach statistical significance. This may be due to the limitation imposed by the relatively small sample size, which restricts the depth of our analysis.

## Generalizability

Based on the results of our study, it was evident that a significant outcome was obtained, that being the direct relationship between screen time exposure

and migraine without aura severity. This finding is not only limited to online distant eloping studies on students' involvement with screen time exposure.

## CONCLUSION

In summary, our research study indicates a significant direct correlation as evidenced by both the Pearson correlation coefficient of 0.386 and the p-value of 0.050 between electronic screen exposure and migraine frequency/severity among UST medicine students engaged in online distance learning. While this correlation underscores the potential health impact of prolonged screen time, the moderately low association suggests a need for cautious interpretation. Other factors explored, such as gender and year level, exhibited positive correlations of 0.283 and 2.955, respectively, but did not reach statistical significance, possibly due to the small sample size limiting the depth of analysis.

Our study highlights a significant correlation between screen time exposure and migraine severity, suggesting the need for schools adopting online or hybrid setups to consider screen hours in their policies. Given the emergence of online learning environments, these factors require careful consideration. While exploring additional factors like gender and year level, limited sample size hindered conclusive findings. Future research should focus on increasing sample size and investigating variables such as screen time quality, exposure environment and participant demographics to better understand the primary causes predisposing individuals to migraine without aura.

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## Author's Contributions

Contribution

1. Research Project
   - A. Conception
   - B. Organization
   - C. Sending of Questionnaires
   - D. Tabulation of Survey Results
   - E. Communication with advisers
2. Research Content
   - A. Abstract
   - B. Introduction
     - I. Background/rationale
     - II. Objectives
   - C. Methods
     - I. Study Design
     - II. Setting
     - III. Participants
     - IV. Variables
     - V. Data Sources/Measurement
     - VI. Literature Review
     - VII. Study Size
     - VIII. Quantitative Variables
     - IX. Statistical Methods
   - D. Results
     - I. Participants
     - II. Descriptive Data
     - III. Outcome Data
     - IV. Main Results
   - E. Discussion
     - I. Key Results
     - II. Limitations
     - III. Interpretation
     - IV. Generalisability
   - F. Conclusion
     - I. Conclusion
     - II. Recommendations
   - G. Other Information
     - I. Funding
     - II. Acknowledgements
   - H. References
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B. Writing of 2nd Draft
C. Writing of Final Draft
D. Review and Critique

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