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DAILY SCREEN TIME DURATION AND TENSION-TYPE HEADACHE RISK AMONG MEDICAL STUDENTS

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ABSTRACT

Introduction: Tension-Type Headache (TTH) is a primary headache disorder that impairs quality of life and academic productivity. Medical students are highly susceptible to TTH due to heavy workloads, psychosocial stress, and prolonged screen time that induces digital eye strain and craniocervical muscle tension. This study aims to determine the prevalence, clinical profile, and subtype distribution of TTH, as well as evaluate the correlation between daily screen time duration and TTH occurrence among medical students.

Methods: An observational cross-sectional study was conducted among active medical students at Universitas Airlangga (n=154). TTH cases and subtypes were classified using a structured questionnaire based on the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria. Data were analyzed using descriptive statistics and Spearman rank correlation tests, reporting sample sizes (n), correlation coefficients (r), and significance values (p).

Results: TTH prevalence was 15.6% (n=24), with the infrequent episodic subtype being the most prevalent (58.3%, n=14). Clinical symptoms predominantly featured mild-to-moderate bilateral pain lasting from 30 minutes to 7 days, without nausea or vomiting. Daily screen time was higher in the TTH group (11±3.04 hours/day) than in the non-TTH group (8±3.50 hours/day). A statistically significant, weak positive correlation was found between daily screen time and TTH occurrence (r=0.19, p=0.019).

Conclusion: Daily screen time duration is correlated with TTH. The correlation strength is weak because the multifactorial etiology of TTH. These findings underscore the importance of implementing digital hygiene and study ergonomics in academic environments.

Keywords: Tension-type Headache; Medical Students; Cross-sectional study; Prevalence; Screen Time

1 INTRODUCTION

Primary headache disorders, particularly Tension-Type Headache (TTH), represent one of the most common neurological conditions impacting global productivity and quality of life. According to the Global Burden of Disease study, the global prevalence of TTH increased by 38% from 1990 to 2021, exceeding 961 million cases worldwide.1In Southeast Asia.[1] Indonesia bears a substantial disability burden from TTH, with an Age-Standardized Years Lived with Disability Rate (ASYR) of 54 per 100,000 population. [2] These figures demonstrate that TTH is not merely a minor physical discomfort, but a significant public health concern, particularly among the productive age group. Medical students represent a highly vulnerable population to TTH due to a combination of intense academic loads, psychosocial stress, and high daily screen time. [3,4] Prolonged electronic device usage encourages non-ergonomic static postures and triggers digital eye strain, which physiologically increases craniocervical muscle tension and induces peripheral as well as central nociceptive sensitization. [5–7] Studies involving medical students confirm that individuals with daily screen time exceeding 8 to 10 hours exhibit a significantly higher incidence of TTH. [4] Furthermore, a previous study on medical students at Universitas Airlangga documented a TTH prevalence reaching 30.5% during the pandemic era.[8]

Comprehensive clinical profiling of TTH and analysis of screen time influences in the post-pandemic learning environment remain limited despite the significant potential impact of TTH on learning focus and academic performance among future healthcare professionals. Conducting this study is essential to provide empirical evidence on the prevalence, distribution of TTH subtypes (infrequent episodic, frequent episodic, and chronic), and clinical characteristics classified under the International Classification of Headache Disorders 3rd Edition (ICHD-3) diagnostic criteria. This mapping is crucial as a scientific foundation for designing health promotion interventions, digital hygiene education, and ergonomic learning environments at the faculty level. This study investigates the prevalence, clinical profile, and subtype distribution of TTH while evaluating the correlation between daily screen time duration and TTH occurrence among medical students at Universitas Airlangga. By providing precise empirical evidence, this research resolves current literature gaps and establishes a crucial scientific foundation for faculty-level health promotion interventions, digital hygiene education, and ergonomic learning environments.

2 MATERIALS AND METHODS

This observational cross-sectional study used questionnaire data from active medical students at the Faculty of Medicine, Universitas Airlangga, Surabaya. Data were collected between May 2026 and December 2026 to examine the association between daily screen time duration and Tension-Type Headache (TTH) occurrence, as well as to identify TTH clinical profiles and subtype distribution. Ethical clearance was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Airlangga (No. 167/EC/KEPK/FKUA/2026), and participants were selected using purposive sampling. Active undergraduate medical students from the 2023 and 2024 academic cohorts aged ≥18 years who completed the questionnaire in Indonesian and provided informed consent were eligible for inclusion. Participants were excluded if they had a history of major head surgery, were diagnosed with other headache types according to the International Classification of Headache Disorders 3rd Edition (ICHD-3) criteria, had severe psychiatric disorders, or submitted incomplete questionnaire data.

Tension-Type Headache status was classified as present or absent, and further categorized into three subtypes: infrequent episodic (<1 day/month), frequent episodic (1–14 days/month), and chronic TTH (≥15 days/month) based on ICHD-3 diagnostic criteria. The independent variable was daily screen time duration (measured in hours per day). A structured questionnaire adapted from the official Indonesian translation of the ICHD-3 criteria was used to evaluate headache characteristics, including attack duration, pain location, quality, intensity, and accompanying symptoms. The questionnaire was administered electronically as a self-reported survey via Google Forms[9].

Both daily screen time duration and TTH characteristics were assessed at a single time point; therefore, no longitudinal analysis was performed on the primary variables. Baseline demographic and anthropometric characteristics, including age, sex, and Body Mass Index (BMI), were recorded for descriptive purposes only.

Descriptive statistical analysis was used to describe demographic, anthropometric, and clinical characteristics, which were reported as frequencies and percentages for categorical variables, and as mean ± standard deviation for continuous variables. Data normality for daily screen time was evaluated using the Kolmogorov-Smirnov test ($p < 0.001$). The non-parametric Spearman rank correlation test was used to examine the association between daily screen

time duration and TTH occurrence, with a p-value of < 0.05 indicating statistical significance. All statistical analyses were conducted using IBM SPSS Statistics software.

3 RESULTS AND DISCUSSION

3.1 Characteristics of Study Participants

The study population was predominantly male, with all participants aged between 18 and 24 years (mean age: 21±0.86 years). Based on Body Mass Index (BMI) categories according to Asia-Pacific standards, normal weight was the single largest category (34.4%, n=53), although more than half of the participants (57.7%, n=89) were categorized as overweight or obese. The mean daily screen time was notably higher among students diagnosed with TTH (11±3.04 hours/day) compared to non-TTH participants (8±3.50 hours/day). Table 1 provides a comprehensive summary of baseline clinical and demographic characteristics.

Table 1: Demographic, anthropometric, and screen time characteristics of participants

Characteristic	N (%) / Mean ± SD
Gender	
-Male	103 (66,9)
-Female	51 (33,1)
Age (years)	21 ± 0.86
-Range (Min-Max)	18–24
Body Mass Index (BMI) (kg/m^2)	
-Underweight (<18,5)	12 (7,8)
-Normal (18,5–22,9)	53 (34,4)
-Overweight (23,0–29,9)	39 (25,3)
-Obesity I (25,0–29,9)	35 (22,7)
-Obesity II (≥ 30.0)	15 (9,7)
Daily Screen Time (hours/day)	
-TTH Group (n = 24)	$11 \pm 3,04$
-Non-TTH Group (n = 130)	$8 \pm 3,50$

This cross-sectional study demonstrated a significant positive correlation between daily screen time and the incidence of tension-type headache among medical students. Students with a TTH diagnosis reported a higher mean daily screen time of 11 hours compared to 8 hours in the non-TTH group. These findings suggest that prolonged digital screen exposure acts as a significant risk factor for TTH development in the academic setting. Biomechanical and visual stressors theoretically drive the association between high screen time and TTH. Prolonged device usage frequently forces the head and neck into static, non-ergonomic positions, such as forward head posture. This constant mechanical load induces fatigue, localized ischemia, and persistent tension in the myofascial structures of the cervical and pericranial regions. This tension ultimately triggers peripheral nociceptive sensitization.[6,10,11] Prolonged visual interaction with digital screens reduces blink rates and causes digital eye strain. This visual strain functions synergistically with musculoskeletal tension to precipitate headache episodes. [12–14]

3.2 Prevalence and Clinical Profile of Tension-Type Headache (TTH)

Tension-Type Headache (TTH) was identified in 24 students (15.6%), while 130 students (84.4%) were classified as non-TTH. The infrequent episodic subtype was the most prevalent (58.3%, n=14) among participants diagnosed with TTH (n=24), followed by frequent episodic TTH (37.5%, n=9) and chronic TTH (4.2%, n=1). Table 2 summarizes TTH prevalence and subtype classification.

Table 2: Prevalence and subtype distribution of Tension-Type Headache

Variable	n (%)
TTH Occurrence (N = 154)	
-TTH	24 (15,6)
-Non-TTH	130 (84,4)
TTH Subtype (n = 24)	
-Infrequent Episodic TTH	14 (58,3)
-Frequent Episodic TTH	9 (37,5)
-Chronic TTH	1 (4,2)

The overall prevalence of TTH in this study was 15.6%, with the infrequent episodic subtype ranking highest at 58.3%. The clinical manifestations presented classic features, primarily involving mild-to-moderate bilateral pressing pain without nausea or vomiting. This prevalence shows a lower rate than previous studies among medical students, which reported rates up to 30.5%. Differences in measurement tools, assessment timing during the academic semester, and specific psychosocial stress levels of the research populations likely explain these variations.[15–19] One interesting demographic finding in this study highlights the higher absolute number of TTH cases among male students. This finding contrasts with the general epidemiological consensus showing a higher TTH prevalence among females. Hormonal fluctuations typically explain the global female predominance, particularly estrogen's effect on serotonin modulation. Estrogen lowers pain thresholds and increases central pain sensitivity. [20–24] Sampling bias likely caused this discrepancy, since male students dominated the initial study cohort at 66.9%. [25–28]

Regarding ICHD-3 clinical diagnostic criteria across all participants (N=154), most students reported headache attacks lasting between 30 minutes and 7 days (71.4%, n=110) and bilateral location (59.7%, n=92). Mild-to-moderate pain intensity was noted in 53.2% (n=82), while 67.5% (n=104) reported no aggravation by routine physical activity. The vast majority of participants were free from associated symptoms such as nausea or vomiting (90.9%, n=140), photophobia (81.8%, n=126), and phonophobia (83.8%, n=129). Table 3 details the distribution of clinical diagnostic criteria.

Table 3: Distribution of clinical diagnostic criteria.

Clinical Diagnostic Criteria	Present n (%)	Absent n (%)
Main Diagnostic Features		
-Duration 30 minutes to 7 days	44 (28,6)	110 (71,4)
-Bilateral location	92 (59,7)	62 (40,3)
-Pressing/tightening (non-pulsating) quality	64 (41,6)	90 (58,4)
-Mild or moderate intensity	82 (53,2)	72 (46,8)
-Aggaravated by routine physical activity	50 (32,5)	104 (67,5)
Exclusionary Features		
-Nausea or vomiting	14 (9,1)	140 (90,9)
-Photophobia	28 (18,2)	126 (81,8)
-Phonophobia	25 (16,2)	129 (83,8)

3.3 Association Between Daily Screen Time and TTH

Kolmogorov-Smirnov test demonstrated that daily screen time data were not normally distributed ($p < 0.001, df = 154$). Consequently, the non-parametric Spearman rank correlation test was conducted. Table 4 shows a statistically significant positive correlation between daily screen time duration and TTH occurrence ($r = 0.19, p = 0.019$).

Table 1: Correlation analysis between daily screen time duration and TTH occurrence (Spearman rank test)

Variable	Total Sample (N)	Correlation Coefficient (r)	p-value
Screen Time (hours/day) and TTH Occurence	154	0,19	0,019

These findings indicate that higher daily screen time duration is associated with an increased likelihood of TTH occurrence among medical students, although the correlation strength is weak (r=0.19), reflecting the multifactorial etiology of TTH. The cross-sectional design inherently restricts the ability to establish a definitive causal temporal relationship between screen time and TTH. Reverse causality might affect this correlation, meaning students experiencing headaches might reduce physical activity and increase sedentary screen time. The reliance on participant questionnaires for screen time duration introduces potential recall bias[7,29,30] . This study did not control clinically relevant confounding variables, such as sleep quality, precise academic workloads, and psychological stress, in a multivariate analysis. These variables might have independently influenced the outcomes. Future research must utilize prospective longitudinal designs, objective digital screen tracking applications, and comprehensive multivariate adjustments to better understand the causal pathways and guide preventative digital hygiene interventions for medical students.

4 CONCLUSION

Daily screen time duration positively correlates with Tension-Type Headache (TTH) incidence among medical students, demonstrating a 15.6% overall prevalence dominated by the infrequent episodic subtype (58.3%). The multifactorial etiology of TTH produces a weak correlation strength, yet these findings highlight an urgent public health concern regarding screen exposure in academic environments. Faculty administrators and medical students must prioritize digital hygiene practices, ergonomic learning setups, and structured breaks to protect student well-being and academic productivity. Future researchers should adopt prospective cohort designs, implement objective screen-tracking software, and employ multivariate regression models to isolate potential confounding variables.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of ethical approval

The Health Research Ethics Committee of the Faculty of Medicine, Universitas Airlangga, approved this study under ethical clearance number 167/EC/KEPK/FKUA/2026. All participants provided written informed consent before participating in the study.

Statement of informed consent

Artificial intelligence-based writing assistants aided language polishing and readability, but the authors maintain absolute responsibility for the scientific integrity and content.

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