

(Research/Review) Article

The Relationship Between Anxiety and Tension-Type Headache in Medical Students

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Abstract: Tension-type headache (TTH) is a common condition, with a prevalence of 46% to 78%, affecting daily activities despite being relatively mild. One of the risk factors for TTH is anxiety, which is prevalent among medical students, especially those undergoing professional medical education due to the program's demands and pressures. This study aims to analyze the relationship between anxiety and the incidence of TTH in medical students. A cross-sectional observational study was conducted with 37 respondents from the Faculty of Medicine at Muhammadiyah University, Semarang, selected through purposive sampling. Data was collected using a questionnaire and analyzed using the Fisher exact test with a significance value of $p < 0.05$. The study found that 16 respondents (43.2%) experienced TTH, with 8 of them experiencing moderate stress and 8 experiencing severe stress. Among the 21 respondents (56.8%) who did not experience TTH, 16 had mild stress, and 5 had moderate stress. The Fisher exact test revealed a significant relationship between anxiety and the incidence of TTH (p -value: 0.001, < 0.05). The results indicate that anxiety is significantly related to the occurrence of Tension-Type Headache in medical students at the Faculty of Medicine, Muhammadiyah University.

Keywords: Anxiety; Medical Education; Medical Students; Stress Levels; Tension Type Headache.

1. Introduction

Tension-type headache (TTH) is a type of primary bilateral headache that occurs in the back (occipital) and front (frontal) of the head and is the most common (Fardhika, 2015; S. Lin et al., 2021). The headache lasts for minutes or even days, is tight or squeezing, and ranges in intensity from mild to moderate. It is generally not accompanied by vomiting or nausea, but may be accompanied by phonophobia or photophobia. Several risk factors contribute to TTH, for example, fatigue, depression, anxiety, and the inability to relax after work (Mahendra, 2020).

Research by Muthmainnina et al. in 2022 showed a high lifetime prevalence of TTH (78%), but the majority experience episodic, infrequent TTH without any specific medical needs. Approximately 24% to 37% experience TTH several times a month, 10% experience it weekly, and 2% to 3% of the population has chronic TTH, which usually lasts for most of a lifetime (Muthmainnina & Kurniawan, 2022).

Fundamentally, headaches are comorbid with various mental disorders, such as anxiety. A person with anxiety will exhibit unusual or unusual behavior, including fear or panic for no apparent reason, excessive or unexplained worry, and re-experiencing a traumatic event (Kurniawan et al., 2016). Excessive anxiety can disrupt psychological well-being and daily activities, which in turn impacts productivity and can be a contributing factor to TTH (Yasa et al., 2016).

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According to the National Comorbidity Study, approximately 1 in 4 people meet at least one of the criteria for an anxiety disorder. This anxiety disorder has a relatively high prevalence of 17.7% and occurs more frequently in women than men, with a ratio of 2:1 (Diferiansyah et al., 2016). Age, gender, occupation, and education influence the relationship between anxiety and TTH. Therefore, the relationship between anxiety and TTH is also influenced by the individual's individual characteristics (Mahendra, 2020).

Individual characteristics are a significant determinant of the relationship between anxiety and TTH. Medical students generally have health-related problems and high stress levels, especially those undergoing medical professional education programs (Sariadi et al., 2022).

Research by Niemi et al. A 2006 study found that approximately 95% of students were in good health and physical condition during their initial education, while approximately 47% experienced serious stress in their final education (Mahendra, 2020). It is rare to find students in their initial education experiencing stress, anxiety, headaches, irritability, or shoulder and neck pain. However, as they entered their medical professional education program, these symptoms became more common (Mahendra, 2020).

Based on the above description, the researcher was interested in conducting research on the relationship between anxiety and the incidence of TTH in students in the Medical Professional Education Program at the Faculty of Medicine, Muhammadiyah University of Semarang.

2. Preliminaries

Table 1. State of the Art.

No	Researcher, Year	Title	Method	Result	Similarity	Differences
1.	Mahendra, Aldo Kresna,(2020).	Hubungan Kecemasan Dengan Kejadian <i>Tension-Type Headache</i> Pada Mahasiswa Kedokteran Universitas Muhammadiyah Sumatera Utara Tahun 2020.	Observational analytical descriptive through a cross-sectional study approach, with sample requirements determined using purposive sampling.	There is a significant relationship between anxiety and TTH incidents in UMSU Medical Faculty students with a p value of 0.0001.	Dependent variables, independent variables, research methods	Research location, research time, sample and population.
2.	Dasa Sariadi, Agus Kusnandang, Reskyanah Manjayanti, (2022). ¹⁰	Hubungan Kecemasan Dengan Kejadian <i>Tension Type Headache</i> Infrequent Mahasiswa Preklinik Tingkat Akhir Fakultas Kedokteran Universitas Swadaya Gunung Jati.	An analytical observational study using a cross-sectional design. A sample size of 128 was selected through simple random sampling. Statistical testing was performed using the Spearman correlation test.	There is a significant relationship ($p < 0.001$) between anxiety and TTH through a moderate correlation with a positive direction ($r = 0.410$).	Research method	Research location, research time, sample and population.
3.	Uskara, Afifah Rifa Farhana A, (2021). ¹	Hubungan Kecemasan di Masa Pandemi dengan Kejadian <i>Tension Type Headache</i> pada Mahasiswa Program Pendidikan Dokter Fakultas Kedokteran Univesitas Hasanuddin Angkatan 2020	Using a cross-sectional design with the sample determined through simple random sampling. Then the Contingency Consistency Test was used to determine the correlation between anxiety and TTH.	A total of 229 subjects with an average age of 18.7-19 years, the majority of whom were female (61.6%). The proportion of subjects experiencing TTH was 43.6%, of which 11.8% were mildly anxious, 19.7% moderately anxious, 17% severe, and 9.6% very severe in the last three months. Furthermore, TTH in subjects with anxiety was statistically significant ($p = 0.001$) through a weak correlation ($r = 0.388$).	Dependent variables and independent variables	Time of research and place of research samples and population.

3. Materials and Method

This research is a descriptive analytical study utilizing a cross-sectional approach with purposive sampling as the data collection method and involving 37 respondents. Data collection took place in January 2024. Primary data were obtained from interviews with respondents, students in the medical professional education program at the Faculty of Medicine, Universitas Muhammadiyah Semarang (UNMUS). The data collected included the anxiety variable using the Beck Anxiety Inventory (BAI) questionnaire, and the tension-type headache variable using the Guttman tension-type headache questionnaire. SPSS version 23 was used for data analysis using the Fisher exact test with a significance value of p-value <0.05.

4. Results and Discussion

4.1. Univariate Analysis

Table 2. Respondents Characteristics

Sample Characteristics	Frequency (f)	Percentage (%)
Sex		
• Male	8	21,6
• Female	29	78,4
Age (Year)		
• 21	5	13,5
• 22	21	56,8
• 23	9	24,3
• 24	2	5,4

Table 3. Overview of TTH Incidence in Students of the Medical Professional Education Program students Faculty of Medicine, Universitas Muhammadiyah Semarang.

TTH Phenomenon	Percentage (%)
Absent	56,8
Present	43,2
Total	100,0

Table 4. Description of Anxiety Levels in Students of the Medical Professional Education Program students Faculty of Medicine, Universitas Muhammadiyah Semarang.

Anxiety Level	Frequency (f)	Percentage (%)
Mild	16	43,2
Moderate	13	35,1
Severe	8	21,6
Total	37	100,0

Table 2 shows that the majority of study respondents, 29 (78.4%), were female, with the majority being 22 years old, or 21 subjects (56.8%). Table 3 shows that the Beck Anxiety Inventory (BAI) questionnaire showed that the majority of respondents experienced mild anxiety (43.2%), and the least experienced severe anxiety (8 respondents, 21.6%). Table 4 shows that the Guttman Tension-Type Headache questionnaire showed that 21 respondents did not experience TTH, and 16 (43.2%) did.

4.2. Bivariate Analysis

Table 5. Results of the Test of the Relationship between Anxiety and the Incidence of TTH in Medical Students (n = 37).

Risk Factor	H Incident				P-value
	Absent		Present		
	N	%	N	%	
Anxiety Level					<0,001*
Low	16	100.0	0	0.0	
Mid	5	38.5	8	61.5	
Severe	0	0.0	8	100.0	
Total	21	56.8	16	43.2	

Table 5, using the Fisher exact test, shows a significant relationship between anxiety and the incidence of TTH in medical students, with a p -value <0.001 . This is indicated by the 16 respondents with mild anxiety, all of whom did not experience TTH (100%), while all of the 8 respondents with severe anxiety experienced TTH (100%). Furthermore, of the 13 students with moderate anxiety, the majority experienced TTH (61.5%).

4.2.1. Overview of the Incidence of TTH in Medical Professional Education Program Students

Based on Table 2, the incidence of TTH in Medical Professional Education Program students at the Faculty of Medicine, Universitas Muhammadiyah Semarang (FK UNIMUS) was 43.2%. This finding is relatively similar to that reported by Sabah et al. in general medicine and dentistry students at King Khalid University, Abha, Saudi Arabia, with an incidence of 56.1% (Sabah & others, 2022). The incidence of TTH in medical students at the University of Baghdad was also relatively similar to the findings of this study, at 57.3% (Hatem et al., 2019). Medical professional education occurs due to the transition from theory to clinical practice. This transition period causes problems related to professional socialization, high workloads, and increased psychological stress. Among the factors strongly associated with psychological stress are lack of focus and anxiety when asked to perform a procedure (Van Dijk et al., 2017). Low resilience in medical professional education program students, or an inability to be flexible and adaptive in facing challenges, can also contribute to the risk of TTH. Resilience can have a protective effect on stress that arises during workplace training and professional quality of life during the medical professional education program, thereby minimizing TTH (Y. K. Lin et al., 2019).

4.2.2. Description of Anxiety Levels in Medical Professional Education Program Students

Based on Table 4, the highest levels of anxiety exhibited by the sample of medical professional education program students fell into the mild category (43.2%), followed by moderate (35.1%). Research on anxiety in medical professional education program students at the Faculty of Medicine, Universitas AD, using the Hamilton Rating Score for Anxiety (HRAS) instrument reported mixed results: 84.8% of students generally experienced no anxiety, 10.9% experienced mild anxiety, and 4.3% experienced moderate anxiety. These levels are relatively similar to those experienced by academic medical students (Fajriati et al., 2018). A 2018 study by Julistia et al., using a self-developed instrument using the Harber and Runyon anxiety dimensions, also reported different results: that the majority of students in the dental professional education program (69.3%) experienced high anxiety, while students in the dental nurse professional education program experienced low anxiety (68.1%) (Julistia et al., 2018). This difference is due to the learning environment, the instrument used to assess anxiety levels, and the categorization. The learning environment is one factor in the emergence of anxiety, one of which is the learning environment in clinical practice. The results of the study showed the opposite, with students in the medical professional education program at the Faculty of Medicine, Universitas Muhammadiyah Yogyakarta (FK UNIMUS) reporting lower anxiety levels. This could be due to more thorough learning preparation and a briefing before entering the clinical learning environment.

4.2.3. Relationship between Anxiety Levels and the Incidence of TTH in Medical Professional Education Program Students.

Table 5 shows a significant relationship between anxiety levels and the incidence of TTH ($p < 0.001$). This is consistent with research by Mardiana et al., (2023) on academic-level students at the Faculty of Medicine, Unisba ($p < 0.001$), Putri Sari et al., (2019) on students at the Faculty of Medicine, Udayana University ($p = 0.001$), and Wijaya et al., (2019) on students at the Faculty of Medicine, Unsri ($p = 0.030$). TTH in this study was commonly found in students with severe anxiety (100%) and mostly in those with moderate anxiety (61.5%). Similar findings were also demonstrated by Mardiana et al., who found that TTH was not experienced by students with mild/low anxiety but was found more frequently in students with moderate anxiety (63.8%) and even more frequently in those with severe anxiety (100%) (Mardiana et al., 2023).

Anxiety disorders are associated with an imbalance of various neurotransmitters, such as serotonin (5HT), norepinephrine (NE), and gamma-aminobutyric acid (GABA). Serotonin deficiency results in vasoconstriction of blood vessels and causes a headache pain threshold (Imran & Marlia, 2015). This vasoconstriction occurs due to muscle contractions around the skull due to stress. Headaches, on the other hand, arise from reduced blood flow due to oxygen deprivation and the accumulation of metabolic byproducts. Another mechanism by which anxiety contributes to TTH is through tension, which initiates mechanical processes in

various muscles, as well as pain irritability and the activation of inflammatory mediators, contributing to increased central pain (Iranian Headache Association, 2022).

5. Conclusion

The incidence of TTH in respondents was 43.2%, with 43.2% categorizing anxiety as mild, 35.1% as moderate, and 21.6% as severe. This study successfully demonstrated a relationship between anxiety and TTH in students of the medical professional education program at the Faculty of Medicine, University of Muhammadiyah Semarang (UNMUS). This relationship is suspected to be related to neurotransmitter imbalance. Future research should include more factors such as stress levels and sleep quality. Furthermore, longitudinal research with a prospective cohort design could be conducted to determine which factor occurred first, whether anxiety or TTH.

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