PROJECT TITLE & AUTHORS

Project Title:	Student Pharmacist Prevalence and Management of Headache Pain	
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PROPOSAL CHECKLIST

Completed (Y)	Checklist item
Y	Project title is clear and concise.
Y	Names and emails for project advisor(s) and up to five students per group are provided.
Y	Abstract is no more than 250 words and retains headings
Y	Introduction provides a definition of the topic under study, importance of the topic, and the issue addressed by the study and is no more than one single-spaced page.
Y	There is NO literature review section
Y	Purpose of project is clearly and concisely stated
Y	Methods section uses headings and represents a summary of the methods used. (Actual methods used should be described if they were modified from the proposal.)
Y	Data analysis described is appropriate and responds to the purpose.
Y	Appropriate tables are included in the results section.
Y	Text of results section interprets the findings reported in the tables, not repeating them.
Y	The discussion section includes a description of the most important findings, and relates findings to the literature.
Y	The final section of the discussion is the limitations section.
Y	The conclusions respond to the purpose statement.
Y	Reference list is complete and contains appropriate references, and reference style is applied correctly and consistently.
Y	Data collection/recording form(s) and/or questionnaire(s) are included in the appendix.
Y	Information is placed in the appropriate section—introduction, methods, results, etc.
Y	Template structure is maintained and all required sections are included. Red text instructions/examples are removed. Proposal is written in Times New Roman 12-point font and does not exceed 10 single-spaced pages (excluding appendices). Proposal has been spell-checked and grammar-checked.

Student Pharmacist Prevalence and Management of Headache Pain

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ABSTRACT

Introduction: Headache is a prevalent, debilitating condition that affects 50% of adults globally. Little is known about headache among student pharmacists. This study described the characteristics and management of headache among student pharmacists, and to compared differences between graduating class years.

Methods: Data were collected on headache characteristics, symptoms, triggers, impact, and pharmacological and non-pharmacological management strategies using an online questionnaire sent to all student pharmacists at one United States college of pharmacy in April 2021. Students who completed the questionnaire and reported having headache were included. Data were compared between graduating class years using Chi-square and Kruskall-Wallis tests as appropriate.

Results: A total of 111 students were included in the study. The most commonly reported headache characteristics were throbbing and pressure-like, moderate intensity, and <4 hours duration. The most common symptoms were neck or shoulder pain, and mood or personality changes. The strongest headache trigger was sleep quantity. The most commonly used pharmacologic strategy was caffeine and most common non-pharmacologic strategies were rest or sleep and drinking water. There were no significant differences between graduating class years for any variable except amount of screen time.

Conclusion: Student pharmacists in this study with headache had characteristics, symptoms, and triggers of headaches in keeping with existing knowledge, and used a variety of pharmacological and non-pharmacological pain management strategies. Headache posed a burden for students suggesting a need for greater student support, despite their perception that headache had a low impact on their grades. Further research is required to confirm these findings.

Key words: Headache, pain management, students, prevalence, management.

Conflicts of interest: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Dr. Axon has received research funding from the American Association of Colleges of Pharmacy, Arizona Department of Health Services, Pharmacy Quality Alliance, Merck & Co., and Tabula Rasa HealthCare Group outside of this study. The other authors have no conflicts of interest to disclose.

Disclosures: None.

Contribution to literature: This study described the characteristics, symptoms, triggers, impact, and management strategies of headaches among student pharmacists at one United States college of pharmacy and compared differences between graduating class years. These findings suggest the need to investigate if and how better educational support is needed for student pharmacists who suffer from headache.

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INTRODUCTION
Headache is defined as pain in any region of the head.[1] Headache is a prevalent and debilitating condition that affects people of all ages, races, income levels and geographical locations.[2] Headaches can negatively impact many aspects of our lives, including our daily activities,

relationships, finances, and education.[2] There are more than 300 types of headaches, of which 90% have an unknown cause.[3] Primary headaches can be classified into a few main categories, including: tension headache, migraine, cluster headache, and medication-overuse headache.[2] It has been estimated that globally, each year, approximately half of the adult population has experienced at least one headache.[2] In the United States (US), approximately 1 in every 6 adults had self-reported migraine and severe headache over a 3-month period.[4]

The direct costs of treating headaches are small in comparison with the substantial indirect costs of poorly treated headaches, such as workdays lost and impact on health. In the US, migraine accounts for more than $20 billion in direct and indirect expenses each year.[5] A retrospective, observational cohort study found adult patients had $2350 higher total mean annual indirect and $6575 higher annual all cause direct healthcare costs than of those patients without migraines between January 2008 and June 2013.[6]

Many individuals affected by headaches do not obtain effective care. For example, in the US, only half of those who reported having a migraine had seen a medical professional for this reason in the previous 12 months, and among those people, most were solely reliant on over-the-counter medications[WHO2016]. There are many explanations as to why headache sufferers do not seek professional help. One possible explanation is that headaches are not seen by the public as a critical issue because they are common, do not cause death, and are not contagious. Another reason is that individuals may be unable to take time off work to seek medical help. A 2016 survey conducted by a medical insurance provider reported 22% of employers found migraine to be a serious enough reason for a work absence.[7] As a result, many headache sufferers must often choose between their work and health.

A further explanation is lack of awareness about headache among healthcare professionals. In the US, medical schools average only 1 hour of pre-clinical and 2 hours of clinical headache teaching.[8] Furthermore, in a survey of academic members of the American Headache Society (AHS), 20% of respondents reported that no headache lecture was offered to the medical students in their institutions.[9] Worldwide, only four hours of undergraduate medical education are offered to training on headache disorders.[2]

Studies have been conducted globally with children, adolescents, students, and adults to examine the prevalence, characteristics, and management strategies of those affected by headache.[10-14] However, the characteristics, symptoms, triggers, impact, and management strategies of headache pain among US student pharmacists has not been investigated. Without this information, it is unclear how headache affects their pharmacy education. There is therefore a need to investigate the characteristics, and management of headache pain among US student pharmacists to address this gap in research.

The purpose of this study was to describe the characteristics, symptoms, triggers, impact, and management strategies of headaches among student pharmacists at one US college of pharmacy, and to compare differences between graduating class years.

METHODS

<u>Study design and eligibility:</u> All student pharmacists currently enrolled at the University of [blinded] College of Pharmacy were eligible to participate in this cross-sectional survey (Total N=512; P1 N=126, P2 N=120, P3 N=136, P4 N=130). Those who did not complete the survey or reported that they did not experience headaches were excluded.

<u>Questionnaire:</u> A 61-item data collection instrument was developed using Research Electronic Data Capture (REDCap; Vanderbilt University Medical Center, Version 8.10.0, Nashville, TN,

United States). REDCap is hosted at The University of [blinded] and serves as a secure, online platform collect research data. The instrument first asked student pharmacists whether they experienced headaches, to determine their eligibility for the study.

Then students were asked to select all applicable characteristics of their headaches (constant, gradual, intermittent, pressing, pressure-like, pulsating, throbbing, sharp-stabbing, sudden), rate the intensity of a typical headache (mild, moderate, severe, incapacitating), report the average number of headaches experienced in the past three months (less than once a week, once a week, more than once a week, four or more times per week), the typical duration of their headaches (less than four hours, between four and 24 hours, more than 24 hours), and to select all applicable symptoms experienced leading up to or during a headache (change in appetite, food cravings, mood/personality changes, neck/shoulder pain, nausea/vertigo, vision changes, other). The next section asked students to rate how much a list of 14 triggers (certain foods, certain odors, sleep quality, sleep quantity, amount of screen time, amount of schoolwork, number of hours worked, amount of exercise, medication, caffeine intake, alcohol intake, bright lights, loud sounds, personal problems) affected their headache, on a scale from 0 (not at all) to five (greatest extent). The next section asked students to rate how frequently headaches negatively impacted a list of nine factors (ability to work, ability to perform daily tasks, grades, leisure activities, mood, personal relationships, quality of life, quality of sleep, quantity of sleep), on a scale from 0 (not at all) to five (greatest extent).

The next section asked students to indicate if they used a particular pain management strategy, and if so, to rate how much each strategy helped manage their headache pain. The list of strategies included 15 pharmacologic management strategies (acetaminophen, anticonvulsants, antidepressants, anxiolytics/sedatives/antipsychotics, acetylsalicylic acid/salicylates, beta-blockers/calcium channel blockers, caffeine, disease-modifying anti-rheumatic drugs (DMARDs)/steroids, injections (any type), muscle relaxers, non-steroidal anti-inflammatory drugs (NSAIDs), opioids, topical products (any type), triptans, other pharmacologic option) and 12 non-pharmacological management strategies (consulted any medical practitioner, activity modification/restriction, exercise/physical activity, cold pack on your head/neck, hot pack on your head/neck, massage, meditation, rest/sleep, complementary and alternative medicine, dietary and herbal supplements, dietary modification, drinking water).

Next, there was an open response item for students to mention anything else about their headaches. Finally, there were four demographic/descriptive items (gender, race, perceived health status, and graduation year). The initial instrument was developed based on items from the literature[10,15] with revisions made in an iterative fashion until the instrument was deemed to have appropriate face validity by the research team.

Data collection: An email inviting students to participate in the online survey was sent in April 2021. A reminder email was sent after one week, and a further reminder email was sent after another week. Data collection stopped at the end of the third week.

Data analysis: Comparisons groups were formed based on the student's year in the pharmacy program (i.e., P1, P2, P3, P4). Differences between groups for categorical data were compared using chi-square tests or Fisher's Exact test as appropriate. Differences between groups for ordinal data were compared using the Kruskal-Wallis test. The *a priori* alpha level was 0.05. Data were analyzed using SAS OnDemand for Academics (Cary, NC, USA). This study was approved by the University of [blinded] Human Subjects Protection Program (protocol #2021-007-PHPR, April 13, 2021).

RESULTS

Study sample: From the eligible population of 512 student pharmacists at the University of [blinded] college of pharmacy, 155 completed the survey (30.3% response rate). Of these, 111 student pharmacists reported having headache pain (P1 N=27, P2 N=33, P3 N=30, P4 N=21) and thus were included in the analysis.

Demographic characteristics, headache characteristics, and headache symptoms: Table 1 reports the demographic characteristics, headache characteristics, and headache symptoms of study participants. Majority of students in the study were female (77.5%), white (72.1%), and reported a median health status of 2 (IQR=1) (on a scale from 0 to 5). Over half of students characterized their headache as throbbing (58.6%) or pressure-like (56.8%), while over 40% of students characterized their headache as pulsating (44.1%) or intermittent (40.5%). Less than one-third of students characterized their headache as gradual (29.7%), pressing (29.7%), constant (28.8%), sudden (27.0%), or sharp-stabbing (26.1%). Students most commonly reported the typical intensity of their headache was moderate (60.4%), the average number of headaches in the past three months was less than one a week (45.1%), and the typical duration of headache was less than four hours (48.2%). The symptoms reported by students in decreasing order of frequency were neck or shoulder pain (46.0%), mood or personality changes (44.1%), nausea and vomiting (32.4%), vision changes (27.9%), change in appetite (18.0%), and others (8.1%). There were no differences in any of these characteristics or symptoms between groups ($p>0.05$).

Headache triggers and impact: Table 2 reports the triggers of headaches and the impact of headaches among the student pharmacists on a 0 to 5 rating scale. The strongest headache trigger was sleep quantity (median=4), followed by sleep quality (median=3), amount of screen time (median=3), amount of schoolwork (median=3), and number of hours worked (median=3). Caffeine intake (median=2), amount of exercise (median=1), bright lights (median=1), loud sounds (median=1), and personal problems (median=1) were weaker headache triggers, while certain food (median=0), certain odor (median=0), medication (median=0), and alcohol intake (median=0) were typically not considered headache triggers. There were no differences between groups for any of the listed triggers ($p>0.05$), except for the amount of screen time ($p=0.03$). Students reported that headache had the greatest impact on their ability to perform daily tasks (median=3) and their mood (median=3), followed by ability to work (median=2), leisure activities (median=2), quality of life (median=2), quality of sleep (median=2), and quantity of sleep (median=2). Headache had little impact on grades (median=1) or personal relationships (median=1). There were no differences between groups for any of the listed impacts ($p>0.05$).

Headache management: Table 3 reports the ratings for how much each strategy helped manage headache pain. The most commonly used pharmacologic strategies were caffeine (100%), acetaminophen (N=74.8%), and NSAIDs (82.0%). All other pharmacologic strategies were used by fewer than 15 (13.5%) people. The most commonly used non-pharmacologic strategies were rest/sleep (98.2%) and drinking water (93.7%). The other non-pharmacologic strategies were also quite commonly used, including massage (70.3%), activity modification/restriction (67.6%), exercise/physical activity (58.6%), cold pack on your head/neck (54.1%), hot pack on your head/neck (36.0%), meditation (33.3%), consulted any medical practitioner (29.7%), dietary modification (23.4%), complementary and alternative medicine (17.1%), and dietary and herbal supplements (16.2%). Among those who used a particular strategy, the most effective strategies (on a scale from 0 to 5) for headache pain management were triptans (median=4) and rest/sleep (median=4). Acetaminophen, beta-blockers/calcium channel blockers, injections of any type,

NSAIDs, consulting a medical practitioner, and drinking water had a median score of 3, while the remaining strategies had a median score less than 3.
Figure 1 reports the sum of ratings for how much pharmacologic, non-pharmacologic, and total number of strategies helped manage headache pain. Pharmacologic strategies had a median score of 3 (IQR=1), non-pharmacologic strategies had a median score of 5 (IQR=4), and total strategies had a median score of 8 (IQR=6). There were no differences between year groups ($p>0.05$).

DISCUSSION

This study reported the characteristics, symptoms, triggers, impact, and management strategies of headaches among student pharmacists at one US college of pharmacy, which are each discussed below and compared to the limited available literature on this topic. This study also sought to compare differences between graduating class years. Except for the amount of screen time as a trigger for headache, there were no statistically significant differences between graduating class years. This finding indicates that the characteristics and management of headache were generally similar regardless of the graduating class year, thus the stage that a student is at in the pharmacy program does not appear to be a relevant factor associated with headache.
Demographic characteristics: The demographic characteristics of study participants were generally representative of the students enrolled in the pharmacy curriculum at this institution. One of the interesting findings among the demographic questions was that student pharmacists who experienced headaches typically perceived their health status as relatively poor, reporting their median health status as 2 (IQR=1) on a scale from 0 to 5 (with 0 being the lowest and 5 being the highest). There is little literature available that has investigated student pharmacists perceived health status to compare our findings to. However, that these typically young, highly educated individuals perceived their health status to be relatively low is concerning and warrants further investigation to determine why this may be and if or how the college of pharmacy can better support students' health.

Headache characteristics: Student pharmacists in this study reported a range of headache characteristics, with over half of respondents reporting throbbing or pressure-like headaches. Other studies have reported similar characteristics among students including sharp-stabbing (ranging from 2.5%-39%; 26% in our study), dull/pressing (ranging from 32%-70%; 30% in our study), pulsating (ranging from 24%-46%; 44% in our study), throbbing (ranging from 24-46%%; 59% in our study), and pressure (ranging from 24%; 30% in our study).[10,14,16-18]
Although most students reported that their headache intensity was typically mild or moderate, approximately 14% reported that their headache intensity was severe, and a further 2% reported their headache intensity was incapacitating. Other studies of students have reported headache intensity was typically mild or moderate,[14,18-19] although these studies also indicate that a small percentage of students (17%) have severe headaches.[14,18] One study of Saudi Arabia medial students reported the mean intensity of headaches on a 0-10 scale was 5.1 ± 1.7.[17]
Almost one-third (32%) of student pharmacists in the current study reported that they experienced a headache at least once per week, and 8% reported that their headache lasted for longer than 24 hours. This finding concurs with existing literature that demonstrates the frequency of headaches among students around the world. A survey of medical and health science students in Ethiopia found that 50% of participants had 1-2 headaches a month, yet 14% had more than one headache per week.[11] A survey of dental students and faculty in India found

that 43% of respondents had migraine often in a month, 31% weekly, and 13% daily.[10] A study of Palestinian medical students found those with migraine had a mean of 46.5±61.2 headaches per year, and those with tension-type had 57.4±69.6 headaches per year.[19] While another study found Saudi Arabia medial students had a median of 15 days of headaches per year (interquartile range = 23).[17]

With regards to headache duration, a survey of dental students in India found that most (76%) headaches lasted less than four hours, although 24% said they lasted more than four hours.[14] A study of Syrian undergraduate medical, dental, pharmacy students reported that most headaches lasted less than four hours (69%), with 3% reporting they last more than 24 hours and the remainder in between 4 and 24 hours (28%).[16] A study of Palestinian medical students found those with migraine had a mean duration of 6.0±4.6 hours, and those with tension-type headache had a mean duration of 3.2±2.7 hours.[19] While another study found Saudi Arabia medial students headaches had a median duration of 2.5 hours (interquartile range = 3.1 hours).[17]

Headache symptoms: Several symptoms of headache were reported by student pharmacists in the current study that parallel those reported in other studies of students with headache, including mood or personality changes (27% in the literature; 44% in our study),[10] and nausea and vomiting (15%-52% in the literature; 32% in our study).[10,14,17,20]

Headache triggers: Some of the strongest triggers of headaches among student pharmacists in this study were quantity and quality of sleep, amount of screen time, amount of schoolwork and number of hours worked. This is perhaps not surprising given that students, especially in the healthcare field, have long days studying and attending practice placements, and in some cases working and caring for their families. Each of these factors may cause headaches, and pharmacy school can be stressful and time consuming. The amount of screen time is interesting given that students are likely using their screens more than previous generations, in both their work and personal lives. There has been an increase in students' use of electronic resources rather than physical resources (e.g., e-books rather than paper textbooks). Furthermore, this study was conducted during the COVID-19 pandemic when students were attending class remotely (at least part of the time), which likely also increased their screen time. Existing studies of students with headache have reported similar common headache triggers, including stress (range 31%-82%),[10-11,14,16,18-20] irregular sleep/sleep deprivation (range 10%-90%),[10-11,14,16,18-21] reading for too long (range 60%-64%),[11,20] change in mood (55%),[11] spending too long on a computer screen (47%).[11] long study hours (range 55%-80%),[19,21] exam stress (range 33%-83%).[18-20] Further support may be warranted to better prepare students for the workload expected in the pharmacy program, to help students better manage their workload, and to encourage students to better balance their screen time to help mitigate these factors.

Headache impact: This study found that headache had the greatest impact on student pharmacists' ability to perform daily tasks and on their mood. Previous studies of students have found headache can impact daily activities to various extents (ranging from 33%-86%).[10-11,14,16] Interestingly, student pharmacist in the current study perceived that headache had little impact on their grades. A study of medical students and interns in Saudi Arabia found migraine headache impacted their educational performance (84%) and ability to attend class (78%).[20] Further, a study of medical students in Pakistan found tension headache and migraine headache impacted them by making them feel absent minded in class (tension 58%, migraine 73%), missing class (tension 19%, migraine 33%), reducing their academic performance (tension 14%, migraine 24%), and retaking exams (tension 5% migraine 7%).[18] Reasons to explain this finding in our study are unknown but demonstrates the resiliency among student pharmacists who appear to find ways to manage their pain to succeed academically.

Headache management: This study found that student pharmacists in all graduating class years managed their headaches using both pharmacological and non-pharmacological strategies. This parallels recent studies that have found pharmacists and the general population used a variety of pharmacological and non-pharmacological pain management strategies.[22-23] The most commonly reported pharmacological pain management strategies were caffeine, acetaminophen, and NSAIDs. This is unsurprising given that acetaminophen and NSAIDs are first-line pharmacological pain relief strategies.

The findings of the current study concur with those of other studies that found students used medications to manage their headaches, with acetaminophen, aspirin, and NSAIDs being the most common.[11,14,16-17,19-20] Another study of previous cohorts of student pharmacists at the same institution as the current study found 76% of student pharmacists used over-the-counter NSAIDs to manage acute pain and 88% used over-the-counter NSAIDs for chronic pain, and 34% used prescribed NSAIDs to manage acute pain and 58% used prescribed NSAIDs for chronic pain.[24]

The current study also reports on the non-pharmacological strategies used by student pharmacists to manage their headaches. Several non-pharmacological strategies were commonly used; the most common being rest/sleep and drinking water. Other studies of students have reported rest, sleep, or lying down as a strategy to manage headache pain.[10-11,17,19] Other strategies commonly reported in the literature included massage,[10] shower,[11,19] caffeine,[17,19] and a cold press.[11,16]

Less than one-third (29.7%) of students in this study reported consulting a medical practitioner to help manage their headaches. This is higher than the figures reported in other studies, which range from 7%-28%.[11,16-17] The tendency among students to avoid professional help may burden students with the need to manage their headaches on their own.

Limitations and future work: Limitations of this study include the nature of self-reported data from a survey of 111 student pharmacists at one US college of pharmacy, which assumed students understood the survey questions and answered them accurately and lacks external validity beyond the population studied. Given the extent of headache implications among student pharmacists in this study, additional studies may be warranted to assess the burden of headache among a broader sample of student pharmacists and among other healthcare students to assess if the findings are similar. A needs assessment may be helpful to better understand how students with headache can be supported, and a future evaluation could be conducted of any programs developed to support students with headache. The findings of this study and the few published studies in this area with which to compare our findings indicates that headache among students is an area that needs additional investigation.

CONCLUSIONS

This survey of student pharmacists at one US college of pharmacy found that students with headache typically perceived their health to be low, had characteristics, symptoms, and triggers of headaches in keeping with existing literature, and used a variety of pharmacological and non-pharmacological pain management strategies, of which triptans and rest/sleep were considered the most effective. Headache appeared to pose a burden for students suggesting a need for greater support for these students, despite their perception that headache had a low impact on their grades. The findings of this study and the few published studies in this area with which to compare our findings indicates that headache among students is an area that needs additional investigation. Further research among a large population of student pharmacists is also required to confirm these findings.

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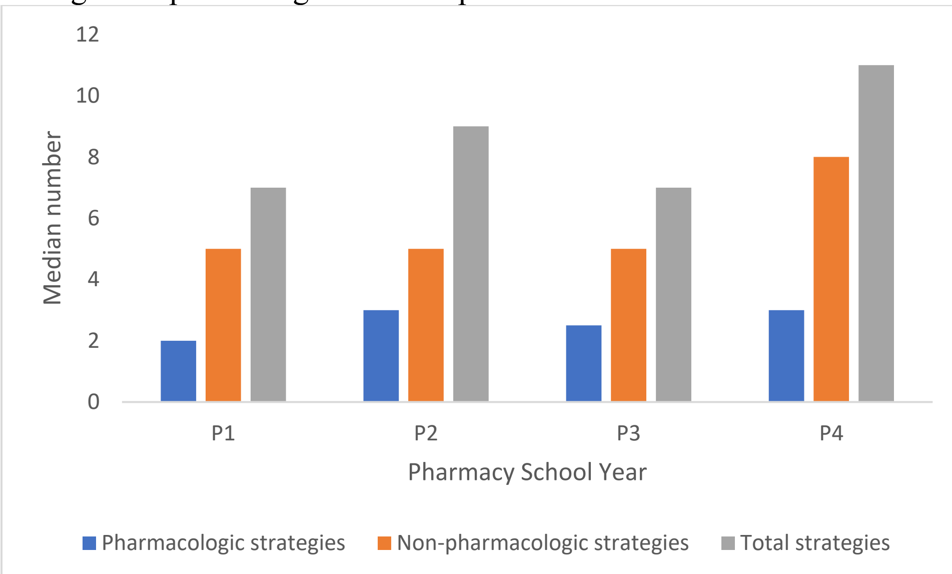
Figure 1. Sum of ratings for how much pharmacologic, non-pharmacologic, and total number of strategies helped manage headache pain



P1=first year student pharmacists; P2=second year student pharmacists; P3=third year student pharmacists; P4=fourth year student pharmacists. Differences between groups compared using Kruskal-Wallis test. Pharmacologic strategies p=0.24, non-pharmacologic strategies p=0.71, total strategies p=0.33.

Table 1. Demographic characteristics, headache characteristics, and headache symptoms reported by student pharmacists

Characteristics	P1 N=27	P2 N=33	P3 N=30	P4 N=21	p-value
Demographic characteristics:					
Gender, N (%)					0.35
Female	23 (85.2)	27 (81.8)	20 (66.7)	16 (76.2)	
Male	4 (14.8)	6 (18.2)	10 (33.3)	5 (23.8)	
Race, N (%)					0.06
White	15 (55.6)	25 (75.8)	21 (70.0)	19 (90.5)	
Other	12 (44.4)	8 (24.2)	9 (30.0)	2 (9.5)	
Perceived health status, Median (IQR)	2 (1)	2 (1)	2 (1)	2 (1)	0.89
Headache characteristics:					
Constant, N (%)	9 (33.3)	8 (24.2)	8 (26.7)	7 (33.3)	0.83
Gradual, N (%)	8 (29.6)	12 (36.4)	6 (20.0)	7 (33.3)	0.53
Intermittent, N (%)	9 (33.3)	15 (45.4)	13 (43.3)	8 (38.1)	0.79
Pressing, N (%)	8 (29.6)	12 (36.4)	5 (16.7)	8 (38.1)	0.28
Pressure-like, N (%)	15 (55.6)	22 (66.7)	17 (56.7)	9 (42.9)	0.39
Pulsating, N (%)	8 (29.6)	15 (45.4)	14 (46.7)	12 (57.1)	0.28
Throbbing, N (%)	15 (55.6)	19 (57.6)	18 (60.0)	13 (61.9)	0.97
Sharp-stabbing, N (%)	6 (22.2)	9 (27.3)	9 (30.0)	5 (23.8)	0.91

Sudden, N (%)	6 (22.2)	12 (36.4)	7 (23.3)	5 (23.8)	0.55
Intensity of typical headache, N (%)					0.29
Mild	6 (22.2)	12 (36.4)	6 (20.0)	2 (9.5)	
Moderate	17 (63.0)	19 (57.6)	18 (60.0)	13 (61.9)	
Severe	4 (14.8)	2 (6.1)	5 (16.7)	5 (23.8)	
Incapacitating	0 (0)	0 (0)	1 (3.3)	1 (4.8)	
Average number of headaches in past three months, N (%)					0.16
Less than once a week	16 (59.3)	15 (45.5)	13 (43.3)	6 (28.6)	
Once a week	5 (18.5)	8 (24.2)	8 (26.7)	5 (23.8)	
More than once a week	4 (14.8)	9 (27.3)	6 (20.0)	3 (14.3)	
Four or more times per week	2 (7.4)	1 (3.0)	3 (10.0)	7 (33.3)	
Typical duration of headache, N (%)					0.35
Less than four hours	15 (55.6)	18 (56.3)	13 (43.3)	7 (33.3)	
Between 4 and 24 hours	11 (40.7)	14 (43.8)	14 (46.7)	12 (57.1)	
More than 24 hours	1 (3.7)	3 (10.0)	3 (10.0)	2 (9.5)	
Symptoms:					
Change in appetite, N (%)	6 (22.2)	5 (15.2)	6 (20.0)	3 (14.3)	0.86
Mood / personality changes, N (%)	14 (51.9)	12 (36.4)	12 (40.0)	11 (52.4)	0.52
Neck / shoulder pain, N (%)	12 (44.4)	11 (33.3)	14 (46.7)	14 (66.7)	0.12
Nausea / vertigo, N (%)	10 (37.0)	7 (21.2)	11 (36.7)	8 (38.1)	0.44
Vision changes, N (%)	7 (25.9)	11 (33.3)	4 (13.3)	9 (42.9)	0.11
Other symptoms, N (%)	2 (7.4)	4 (12.1)	0 (0)	3 (14.3)	0.15

P1=first year student pharmacists; P2=second year student pharmacists; P3=third year student pharmacists; P4=fourth year student pharmacists; IQR=interquartile range.
Differences between groups for categorical data compared using chi-square tests except 'Intensity of typical headache', 'Average number of headaches in past three months', 'Typical duration of headache', 'Change in appetite', and 'Other symptoms' where Fisher's Exact test was used. Differences between groups for ordinal data compared using the Kruskal-Wallis test.

Table 2. Triggers and impact of headache reported by student pharmacists

Variables	P1 N=27 Median (IQR)	P2 N=33 Median (IQR)	P3 N=30 Median (IQR)	P4 N=21 Median (IQR)	p-value
Triggers:					
Certain food	0 (1)	0 (1)	0 (0)	0 (1)	0.72
Certain odors	1 (2)	0 (2)	0 (1)	0 (3)	0.09
Sleep quality	3 (2)	3 (2)	4 (3)	3 (1)	0.39
Sleep quantity	3 (2)	4 (2)	4 (3)	3 (1)	0.50
Amount of screen time	4 (3)	3 (1)	4 (3)	2 (2)	**0.03**
Amount of school work	4 (3)	3 (2)	4 (3)	3 (1)	0.27

Number of hours worked	3 (3)	3 (3)	4 (3)	4 (2)	0.24
Amount of exercise	1 (2)	1 (2)	1 (2)	0 (2)	0.64
Medication (over-the-counter and prescription)	0 (0)	0 (0)	0 (1)	0 (2)	0.46
Caffeine intake	2 (3)	2 (2)	2 (2)	2 (4)	0.92
Alcohol intake	0 (2)	0 (1)	0 (3)	0 (3)	0.61
Bright lights	2 (3)	1 (2)	1.5 (3)	2 (3)	0.82
Loud sounds	1 (3)	1 (2)	1 (3)	2 (3)	0.32
Personal problems	1 (3)	1 (2)	2 (3)	2 (3)	0.47
Impact:					
Ability to work	3 (1)	2 (2)	2.5 (2)	3 (2)	0.06
Ability to perform daily tasks	3 (1)	2 (2)	2 (2)	3 (2)	0.43
Grades	1 (2)	1 (2)	1 (2)	2 (3)	0.07
Leisure activities	2 (2)	2 (3)	3 (3)	2 (3)	0.19
Mood	3 (2)	3 (2)	3 (2)	3 (2)	0.13
Personal relationships	1 (3)	1 (2)	1 (2)	1 (1)	0.53
Quality of life	2 (3)	1 (2)	2 (2)	2 (3)	0.10
Quality of sleep	2 (2)	1 (2)	1.5 (2)	2 (3)	0.39
Quantity of sleep	2 (2)	1 (2)	1.5 (2)	2 (3)	0.43

P1=first year student pharmacists; P2=second year student pharmacists; P3=third year student pharmacists; P4=fourth year student pharmacists; IQR=interquartile range.
Differences between groups compared using Kruskal-Wallis test.
All items had a response scale from 0 (not at all) to 5 (greatest extent).

Table 3. Ratings for how much each headache pain management strategy helped as reported by student pharmacists

Strategy	Median (IQR)
Pharmacological:	
Acetaminophen (N=83)	3 (3)
Anticonvulsants (N=7)	2 (3)
Antidepressants (N=10)	0.5 (2)
Anxiolytics/Sedatives/Antipsychotics (N=7)	2 (4)
Acetylsalicylates (N=12)	2.5 (2)
Beta-blockers/Calcium channel blockers (N=8)	3 (1.5)
Caffeine (N=111)	2 (2)
DMARDs/Steroids (N=2)	0.5 (1)
Injections (any type) (N=4)	3 (4.5)
Muscle relaxers (N=3)	1 (3)
NSAIDs (N=91)	3 (3)
Opioids (N=5)	1 (4)
Topical products (any type) (N=4)	2 (3)
Triptans (N=15)	4 (4)
Other pharmacologic (N=6)	3 (1)

Non-pharmacological:	
Consulted any medical practitioner (N=33)	3 (3)
Activity modification/restriction (N=75)	2 (2)
Exercise/physical activity (N=65)	1 (2)
Cold pack on your head/neck (N=60)	2 (2)
Hot pack on your head/neck (N=40)	1 (2)
Massage (N=78)	2 (2)
Meditation (N=37)	1 (1)
Rest/sleep (N=109)	4 (3)
Complementary and alternative medicine (N=19)	1 (4)
Dietary and herbal supplements (N=18)	1 (2)
Dietary modification (N=26)	1.5 (3)
Drinking water (N=104)	3 (3)

DMARDs=disease-modifying anti-rheumatic drugs; NSAIDs=non-steroidal anti-inflammatory drugs.
N indicates the number of people who used the strategy. All items had a response scale from 0 (used with no benefit) to 5 (greatest benefit), and a N/A option for those who did not use the strategy.