Migraine Management Using Feverfew, Butterbur, Peppermint, and Ginger: Perspectives of Pharmacy Students

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Abstract:

A literature search and a survey of pharmacy students were conducted regarding some common herbs used for the treatment of migraine. The literature search shows that feverfew, traditionally used for migraines, had mixed evidence of effectiveness, while butterbur received a strong recommendation for prevention. Peppermint showed promise in reducing headache intensity, particularly when given intranasally, but ginger's efficacy remains unclear. Further research is needed to confirm ginger's role in migraine treatment. The survey, which was conducted among 39 pharmacy students on five knowledge-based and five opinion-based questions regarding the use of herbal remedies revealed a varied comprehension level, with an overall 69% accuracy in knowledge-based responses regarding migraines. For the most part, respondents demonstrated awareness of lifestyle measures in preventing migraines, but many respondents lacked clarity on self-medicating with herbal remedies and over the counter products. Opinion-based inquiries indicated a positive inclination towards herbal remedies, with more than 80% agreeing on their viability as alternatives to conventional medications. The survey showed a 69% average correctness rate for knowledge-based questions about migraines. Maintaining a regular sleep schedule received the highest accuracy at 94.1%, while stress as a trigger for migraines received a 71.4% correct response rate. Over 70% believed that those using herbal remedies for migraines were generally more satisfied with their treatment outcomes. While there is a need for improved education on migraine-related topics, there is a prevailing positive attitude toward the potential benefits of herbal remedies in managing migraines. Diverse opinions existed on satisfaction levels and the comparative effectiveness of lifestyle changes versus herbal interventions. Despite limitations in the sample size and focus on pharmacy students, the study underscores the need for enhanced education on migraines while highlighting growing interest in alternative healthcare among healthcare professionals.

Keywords: *migraine, feverfew, butterbur, peppermint, ginger, pharmacy students.*

Introduction

Migraine is one of the most common neurologic disorders affecting more than a billion people each year worldwide. It is associated with many comorbidities, which range from stress and sleep disturbances to suicide (Amiri et al., 2022). It is a common headache disorder which is ranked globally as the seventh highest complication

causing disability. It has a prevalence of 14.7% worldwide. In eight European countries, 55% of the adult population spends an average of EUR 1,222 per person as indirect costs, with a total of annual expenditure of EUR 111 billion among adults aged 18 to 65 years. Migraine attack without aura lasts 4 to 72 hours, with pulsating headaches characterized by moderate or severe intensity. The attack is aggravated by routine physical activity, and it is associated with nausea and/or photophobia and phonophobia. On the other hand, migraines with aura are characterized by focal neurological symptoms that precede the headache. Aura usually develops gradually over 5 to 20 minutes and lasts for less than 60 minutes. A headache with or without the features of migraine may accompany or follow the aura symptoms within 60 minutes (Wider et al., 2015).

Review of Herbs Used for Migraine

Feverfew (*Tanacetum parthenium*)

Feverfew (*Tanacetum parthenium* L.) is traditionally used for the treatment of fevers, migraine headaches, rheumatoid arthritis, stomach aches, toothaches, insect bites, infertility, and problems with menstruation and labor during childbirth. The feverfew herb has a long history of use in traditional and folk medicine, especially among Greek and early European herbalists. Feverfew has also been used for psoriasis, allergies, asthma, tinnitus, dizziness, nausea, and vomiting. A meta-analysis reported insufficient evidence to conclude whether feverfew was superior to placebo in reducing the frequency and severity of migraine attacks, incidence and severity of nausea and vomiting, and global assessment of efficacy in patients with migraine headaches (Parek et al., 2011). In a recent update of a Cochrane systematic review of six double-blind randomized control trials RCTs, Wilder, et al. (2015) further concluded a low quality of evidence that feverfew is effective in migraine prevention. However, the authors cited a newer study that demonstrated a 60% decrease in migraine frequency of attacks compared with placebo. In the study, no major safety issues were reported. In another research, Kau et al. (2021), feverfew was reported to reduce the number of days of migraine attacks in patients.

Butterbur (*Petasites hybridus*)

Butterbur (derived from the leaves of *Petasites hybridus*) is an herbal supplement that has been found to be effective in the prophylaxis of adult migraines in multiple studies. The American Headache Society gave the herb a level A recommendation and declared it effective in preventing migraine headaches (Din and Lui, 2023). Petasins are the pharmacologically active ingredients of butterbur that have therapeutic benefits in the treatment of migraine and tension headaches. It was determined that the root extract inhibits the release of calcitonin-gene-related peptide (CGRP) of meningeal afferents during migraine attacks. In randomized, double-blinded, and placebo-controlled trials, the root extract Petadolex® reduced the frequency of migraine attacks significantly at 150 mg/day, and no relevant abnormal liver function was reported (Borlak et al., 2022).

Peppermint (*Mentha piperita*)

Peppermint is a fragrant herb from peppermint plant leaves, valued for its ability to ease digestive issues, freshen breath, and induce relaxation. It is often used in teas, essential oils, and remedies, providing numerous health and wellness advantages. Peppermint has a rich history in traditional herbal practices. A recent study aimed to compare the effects of intranasal lidocaine 4% and peppermint essential oil drop of 1.5% on migraine attacks in 120 adult patients diagnosed with migraines. The study followed a double-blind, randomized controlled trial design. After administering the treatments, patients reported their symptoms at different time intervals. Researchers found a significant difference among the treatment groups in terms of headache intensity reduction. Notably, in the peppermint oil and lidocaine groups, 40% of patients experienced a decrease in headache intensity. In contrast, the placebo group showed fewer positive responses to the treatment. Specifically, 41.5% of patients in the lidocaine group and 42.1% of patients in the peppermint

oil group responded well to the treatment (Rafieian-Kopaei et al., 2019).

Ginger (*Zingiber officinale*)

Ginger is a natural rhizome spice derived from the *Zingiber officinale* plant, cherished for its potential in aiding digestion, reducing nausea, and providing anti-inflammatory benefits. Ginger is commonly included in culinary dishes, herbal teas, and supplements, offering a wide array of health advantages, and has been a traditional remedy for centuries. In a systematic review and meta-analysis, the efficacy of ginger for treating migraines was investigated (Göbel et al., 2016). In a double-blind, placebo-controlled randomized clinical trial involving 107 patients, the effect of ginger on migraine attacks was shown to be not statistically different from the placebo. However, there was a decrease in the number of days with severe pain, analgesic use for acute migraine and duration of migraine attacks in both groups, without significant difference between ginger and placebo (cellulose) groups (Martin et al., 2019). It appears that the use of cellulose was not perhaps an appropriate choice for the placebo group.

Health Care Professionals' Knowledge & Opinion

No specific research has been done on what healthcare professionals think about Feverfew, Butterbur, Peppermint, and Ginger for migraines. It has been suggested that physicians need to educate their patients about lifestyle modification due to multiple migraine triggers, and suggest herbal supplements, vitamins, and minerals to patients who experience side effects from pharmaceutical drugs and desire a more natural treatment. (Kaur et al., 2021).

Literature Gap, Study Objective, and Impact

While there is a good amount of information available about herbs and dietary supplements, there is a clear lack of research that explores what healthcare professionals, including pharmacy students, think about using herbs like Feverfew, Butterbur, Peppermint, and Ginger for managing migraines. To fill this knowledge gap, this study aims to thoroughly investigate the understanding and perspectives of healthcare professionals, particularly pharmacy students, regarding the use of these herbal remedies in migraine management. After the literature review, we proceeded to carry out the survey.

Methods

As part of the Drug Informatics course, a required 2-credit-hour class for first-year professional pharmacy students, a survey was conducted. This course provided students with instruction in research methodology and survey administration. Each student was assigned an individual topic and responsible for crafting an introduction and developing two sets of survey questions. The first set comprised 5 knowledge-based questions, while the second set consisted of 5 opinion-based questions. These questions were crafted into an online survey, and all students were encouraged to participate in responding to them. Following the completion of the survey, a descriptive statistical analysis was conducted, and the results were shared with the students. They were then guided to incorporate these findings into their research papers, with a specific focus on improving the discussion, conclusion, and abstract sections of their papers.

This study involved a comprehensive literature review to assess the efficacy of various herbs for migraine management, alongside a survey of pharmacy students to gauge their opinions and knowledge on the topic. The survey data were entered into a spreadsheet and the results were analyzed. Opinion-based statements were scored using a Likert scale (4=strongly agree, 3=agree, 2=disagree, 1=strongly disagree), and statistical measures such as mean, standard deviation, and variance were computed for each response and cumulatively.

Results and Discussion

Demographics

Table 1 contains data detailing the demographics of the survey participants, encompassing gender, age distribution, and geographic backgrounds. A total of 39 individuals took part in the survey, resulting in an impressive response rate of

97.5%. Roughly a quarter (25.6%) of the participants were males, while the majority (74.5%) were females. The respondents represented various age groups, with the highest percentages in the 18-24 (51.3%) and 24-30 (38.5%) categories. A smaller segment (2.6%) fell into the above 40 age. Before joining Howard University College of Pharmacy program, about 15.8% of participants were from Washington DC, 39.5% from Maryland, 2.6% from Virginia, and the largest group (42.1%) came from other states.

Table 1. Demographic Data of the Participants

		n (%)
Gender	Male	10 (25.6)
	Female	29 (74.4)
Age (years)	18-24	20 (51.3)
	24-30	15 (38.5)
	30-40	3 (7.7)
	Above 40	1 (2.6)
State you lived in before coming to Howard Pharmacy Program*	Washington DC	6 (15.8)
	Maryland	15 (39.5)
	Virginia	1 (2.6)
	Other States	16 (42.1)

Note: One participant did not disclose residence

Participant's Work and Educational Background

Among the pool of 39 respondents, information regarding their professional backgrounds and educational paths prior to their acceptance into Howard University's Pharmacy program has been highlighted. Concerning work experience, more than half of the respondents (54.1%) had employment directly related to pharmacy, while 24.3% were engaged in health-related fields not specific to pharmacy, and 21.62% worked in non-health-related positions. In terms of their highest educational attainment, the majority (66.7%) held either a Bachelor of Science (BSc) or Bachelor of Arts (BA) degree. A smaller portion (17.9%) possessed a Master of Science (MSc) degree, and 10.3% completed some college coursework or pre-pharmacy studies.

The lowest percentage (5.1%) had obtained an associate degree. These findings provide a glimpse of the diverse professional experiences and educational backgrounds of the respondents, providing important context for their pursuit of a pharmacy education.

Table 2. Work and Educational Background of the Participants

Questions	Responses	n (%)
How many years have you had a paying job before joining the Pharmacy program at Howard?	Never worked	2 (5.1)
	1-2 years	12 (30.8)
	3-4 years	9 (23.1)
	5 or more	16 (41.0)
What kind of work have you had?	Pharmacy Related work	20 (54.1)
	Non-Pharmacy but other health related work	9 (24.3)
	Non-Health Related	8 (21.6)
What is the highest educational level you have achieved before joining the pharmacy program at Howard?	Pre-Pharmacy or some college work	4 (10.3)
	Associate degree	2 (5.1)
	BSc or BA	26 (66.7)
	MSc	7 (17.9)
	PhD or Doctoral Degree	0 (0.0)

Knowledge-Based Questions

Upon evaluating respondents' knowledge about migraines using a series of five specific questions, the overall average correctness percentage amounted to 69%. The question demonstrating the highest accuracy, with 94.1% correctness, highlighted the recommendation of maintaining a regular sleep schedule as a preventive measure for migraines. 71.4% of respondents provided a correct answer that stress is indeed a common trigger for migraines indicating (Question 2). Furthermore, the notion that migraines are solely severe headaches without other symptoms (Question 1) received a correctness rate of 65.7%. In terms of understanding the risks associated with self-medicating using herbal remedies without consulting healthcare professionals (Question 4), a significant portion of participants, around 62.9%, acknowledged these risks. However,

regarding over-the-counter pain relievers being the most effective treatment for all types of migraines (Question 5), the responses were more balanced, with a correctness rate of 51.4%. This analysis demonstrates varied levels of comprehension among participants regarding different aspects of migraines. While some questions achieved a higher consensus among respondents, others revealed areas where opinions were more diverse. Table 3 provides details about the migraine-related questions, displaying the percentage of "True" and "False" responses.

Table 3. The Results of the Knowledge-Based Questions

Questions	Correct Answer	Participants with Correct answers	True (*n*)	False (*n*)	Mean correct answer rate (± SD) out of 1	Variance
Migraines are just severe headaches and do not involve any other symptoms	False	23 (65.7)	12	23	0.6571±0.4766	0.2253
Stress is not considered to be a common trigger of migraines	False	25 (71.4)	10	25	0.7143±0.4518	0.2041
Keeping a regular sleep schedule is generally recommended as a preventive measure for migraines	True	30 (94.1)	32	2	0.9412±0.2353	0.0554
Patient should self-medicate with herbal remedies without consulting a healthcare professional	False	22 (62.9)	13	22	0.6286±0.4832	0.2235
Over-the-counter pain relievers are the most effective for types of migraine	False	18 (51.4)	17	18	0.5143±0.4998	0.2498
Average Correct answer		69.1%			0.6911±0.4293	0.1916

Opinion-Based Questions

Table 4 depicts responses to opinion-based statements about the efficacy of herbal remedies in managing migraines. A total average of about 86% of the respondents agreed with the opinion statements. The highest agreement rate (strongly agree and agree responses) was 97.1% to the statement that the healthcare system should invest more in research and herbal remedies for migraine to provide better treatment options. This was followed by 94.1% who think that migraines can significantly impact a person's emotional well-being and mental health, and they also hold the opinion that this aspect is often overlooked. The other statements received agreement rates ranging from 80.6 to 88.0%.

Table 4. Opinion-Based Questions (n =34)

#	Statements	SA (n, %)	Agree (n, %)	DA (n, %)	SDA (n, %)	Mean LK±SD	Variance
1	I believe the use of herbal remedies for migraine management is a viable alternative to conventional medications	13 (38.2)	15 (44.1)	5 (14.7)	1 (2.9)	3.1765±0.7848	0.6159
2	I think patients who have tried herbal remedies for migraines are more generally satisfied with treatment outcomes than	9 (26.5)	15 (44.1)	10 (29.4)	0 (0.0)	2.9706±0.7470	0.5580

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#	Statement					Mean±SD	
	those who use only conventional medications						
3	I agree that the healthcare system should invest more in research and on herbal remedies for migraine to provide better treatment options	14 (41.2)	19 (55.9)	1 (2.9)	0 (0.0)	3.3824±0.5431	0.2950
4	I believe incorporating lifestyle changes, such as diet and exercise, is more effective than herbal remedies in preventing migraine attacks	13 (38.2)	17 (50.0)	4 (11.8)	0 (0.0)	3.2647±0.6557	0.4299
5	I think migraines can significantly impact a person's emotional well-being and mental health, and this aspect is often overlooked	17 (50.0)	15 (44.1)	2 (5.9)	0 (0.0)	3.4412±0.6035	0.3642
	Average	38.8%	47.6%	12.9%	0.59%	3.2746±0.6668	0.4526

Discussion

The study aimed to achieve two main objectives. Firstly, it aimed to conduct a comprehensive literature review on the efficacy of commonly used herbs for managing migraine headaches. Secondly, it sought to survey pharmacy students to gather their knowledge and opinions on this topic.

The comprehensive review shows that the herbs reviewed have varied efficacy. For example, feverfew has a rich history in traditional medicine and is utilized for various ailments including fevers, migraines, arthritis, and digestive issues. While some studies suggest its efficacy in reducing migraine frequency, others report inconclusive evidence. On the other hand, butterbur has been extensively studied and received a level A recommendation from the American Headache Society for its effectiveness in preventing migraines. Its active ingredient, petasins, inhibits the release of calcitonin-gene-related peptide (CGRP) during migraine attacks. The other two herbs, peppermint and ginger are also popular herbal remedies for migraines, with peppermint showing promising results in reducing headache intensity, particularly when administered intranasally. However, ginger's efficacy in treating migraines remains uncertain based on available evidence. While some studies indicate a decrease in migraine duration and severity with ginger use, others found no significant difference compared to placebo, highlighting the need for further research in this area.

Regarding the survey, the data on knowledge questions related to migraine reveals a mixed level of understanding among participants. An average of 69% of the participants answered all five knowledge-based questions correctly. The descriptions for each question provide clarity on the reasoning behind the correct and incorrect answers.

The statement that migraines are just severe headaches that do not involve any other symptoms is false because migraines often come with additional symptoms such as nausea, vomiting, sensitivity to light and sound, and visual disturbances. Recognizing these accompanying symptoms is crucial for an accurate understanding of migraines. Stress is a common trigger for migraines. Many individuals experience migraines during or after stressful situations, emphasizing the role of stress in migraine onset. Keeping a regular sleep schedule is generally recommended as a preventive measure for migraines. This statement is true as irregular sleep patterns can trigger migraines. Maintaining a consistent sleep schedule is

advised to regulate the body's internal clock and reduce the likelihood of migraine attacks.

The statement that patients should self-medicate with herbal remedies without consulting a healthcare professional is false. Self-medicating with herbal remedies or conventional medications, without consulting a healthcare professional is not advisable. Herbal remedies, like any other treatment, should be used under professional guidance to ensure safety and efficacy. The effectiveness of over-the-counter pain relievers for all types of migraines varies among individuals and types of migraines. While over-the-counter pain relievers may work for some, other individuals may require prescription medications or alternative approaches for effective migraine management.

In summary, the responses to the knowledge-based questions about migraines revealed a diverse understanding among participants. The explanations provided for each question aim to clarify the fine distinction associated with migraine triggers, preventive measures, and treatment approaches, reflecting the complexity of the condition and the importance of individualized care.

The responses to the opinion-based statements indicated a positive attitude toward herbal remedies as an alternative to conventional medications. In relation to patient satisfaction, 70.6% believed that individuals using herbal remedies for migraines were generally more satisfied with their treatment outcomes compared to those solely relying on conventional medications. However, 29.4% disagreed, suggesting a balanced viewpoint on satisfaction levels associated with herbal remedies. The statement about investment in herbal migraine research, received an overwhelming 97.1% respondents who supported increased healthcare system investment. Only 2.9% disagreed with this stance, emphasizing the perceived importance of exploring herbal remedies for better treatment options. Regarding the effectiveness of lifestyle changes versus herbal remedies in preventing migraine attacks (question four), 88.2% agreed that lifestyle changes were more effective, while

11.8% disagreed, indicating a significant divergence in opinions on the most impactful approach to migraine prevention. The final question addressed the emotional and mental impact of migraines, with 94.1% agreeing that migraines significantly affect emotional well-being and mental health. This high level of agreement underscores the recognition of broader implications of migraines beyond physical symptoms. The total average Likert score of 3.2746 (Table 4) is consistent with overall agreement trends. For each of the opinion-based statements, the Likert score of 2.9 or more shows closeness to agreement with the statements.

Conclusion

The study aimed to conduct a literature review on common herbs for migraine management and survey pharmacy students for their opinions. Feverfew, traditionally used for migraines, had mixed evidence of effectiveness, while butterbur received a strong recommendation for prevention. Peppermint showed promise in reducing headache intensity, particularly intranasally, but ginger's efficacy remains unclear. Further research is needed to confirm ginger's role in migraine treatment. The survey involving 39 participants highlighted varying levels of understanding about migraines, indicating the need for better education on the topic. While some uncertainties existed among participants about migraines, most showed positive attitudes toward using herbal remedies for migraine relief. The survey respondents supported the idea of more research on herbal remedies for migraines. Participants had positive views on herbal remedies for migraines, indicating a growing interest in alternative healthcare. The study has limitations, such as its small sample size and the focus on pharmacy students, which may not represent pharmacy students' views in other institutions. Further research with a larger and more varied group could offer a deeper understanding of knowledge and opinions on herbal remedies for migraines.

Acknowledgement

Conflict of Interest

The authors declare no conflict of interest.

Statement of Informed Consent

Informed consent was not required from the survey participants, because it was part of a Drug Informatics course given by Professor BH, who is a co-author of this paper.

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