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ASTHMA AND HERBAL REMEDIES: BOSWELLIA, EUCALYPTUS, LICORICE, BUTTERBUR—STUDENT PERSPECTIVES

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ABSTRACT

This study aimed to evaluate pharmacy students' knowledge and perceptions regarding the use of Boswellia, Eucalyptus, Licorice Root, and Butterbur in asthma management, while emphasizing the importance of safety and evidence-base practice. **Methods:** A cross-sectional study was conducted using five knowledge-based and five opinion-based questions on four herbal remedies to assess first-year pharmacy students. The data collected from 28 participants were analyzed using SPSS for correctness and agreement. **Results:** The True or False Questionnaire displays that majority of respondents (75%) believe that Eucalyptus can be beneficial in alleviating asthma symptoms and improving breathing. Many respondents (82.1%) recognize that licorice root is known to be a natural remedy for managing asthma. Almost all respondents (89.3%) were aware of butterbur containing small levels of pyrrolizidine alkaloids. Approximately 50% of respondents (46.4%) knew that complementary therapies like boswellia, eucalyptus, licorice root, and butterbur could not replace conventional asthma medications for long-term asthma management. Less than 50% of respondents (42.9%) believed that Boswellia has not been scientifically proven to effectively treat asthma symptoms. Opinion-based were evaluated as well and showed belief in Boswellia's Effectiveness and over 90% of respondents either agree or strongly agree with the effectiveness of Boswellia as a treatment for asthma. The majority (82.1%) agrees or strongly agrees that Eucalyptus can help alleviate asthma symptoms and improve lung function. Responses are varied regarding the effectiveness of Licorice Root, with (64.3%) expressing agreement or strong agreement. A majority (82.1%) agrees or strongly agrees that

Butterbur is a well-established herbal treatment for asthma. Responses vary on the replacement of conventional asthma medications with complementary therapies, with 75% expressing agreement or strong agreement. **Conclusions:** This study highlights a gap between pharmacy students' knowledge and perceptions of herbal remedies in asthma management. Pharmacy students demonstrated basic awareness of herbal remedies but overestimated their effectiveness and role in the management of asthma. Misconceptions about replacing conventional therapies highlight a need for improved education on evidence-based practice and safety using CAM therapies in pharmacy curricula. Additionally, caution should be exercised when considering the complete replacement of conventional asthma medications with complementary therapies. A collaborative approach involving healthcare professionals is essential to ensure informed decision-making and optimal asthma management.

KEYWORDS: Asthma, Herbal Remedies, Herbal Medicine, Complementary and Alternative Medicine, Phytotherapy, Herbal Anti-inflammatory Agents.

INTRODUCTION

Asthma is a chronic inflammatory respiratory disease characterized by airway hyperresponsive, bronchoconstriction, and recurrent symptoms such as wheezing and dyspnea. Asthma remains a significant global health concern and in 2019, according to the World Health Organization it affected an estimated 262 million people and caused 455,000 deaths (WHO, 2024).

While conventional/standard therapies including inhaled corticosteroids (ICS) and bronchodilators remain the cornerstone of management, there is growing interest and attention in Complementary and Alternative Medicine (CAM), particularly herbal interventions colloquially know as a remedy.

Herbal Remedies Review

Boswellia (Boswellia serrata)

Also known as Indian frankincense, contains active compounds called boswellic acids[1]. These compounds inhibit leukotriene synthesis and may help reduce inflammation in the airways. While there is limited research on the use of Boswellia for asthma specifically, its anti-inflammatory effects may offer some benefits in reducing asthma symptoms related to inflammation.

A clinical trial, conducted in 1998, used the resin containing boswellic acids which is known to inhibit the biosynthesis of leukotrienes[2]. The six-week double-blind, placebo-controlled study involved forty people. Results indicated a notable improvement in patients, demonstrated by the disappearance of physical symptoms, reduced frequency of attacks, as well as a decrease in eosinophilic count. In contrast, the control group of forty patients received lactose at the same dosage, which showed minimum improvement. These findings underscore the discernible efficacy of Boswellia serrata resin in the management of bronchial asthma, however, more research is needed to determine the optimal dosage and long-term effects of Boswellia in asthma management.

Eucalyptus oil (Eucalyptus globulus)

Obtained from the leaves of eucalyptus trees, is known for its respiratory benefits[3]. It contains compounds with bronchodilator and anti-inflammatory properties. Eucalyptus oil can be used for steam inhalation, which may help relieve congestion and improve breathing.

After the completion of clinical trial conducted in 2003 it was determined that the inflammatory compound in Eucalyptus 1.8-cineol should evidence that it could be used as an agent in upper and lower airway diseases[4]. While it can provide temporary relief from asthma symptoms, it should not replace prescribed medications, and people with asthma should be cautious about potential allergic reactions.

Licorice Root (Glycyrrhiza glabra)

Has been traditionally used for its anti-inflammatory and soothing properties[5]. Glycyrrhizin, a compound in licorice, may help reduce inflammation in the airways. Some studies suggest that licorice root extract may improve lung function and reduce the frequency of asthma symptoms.

A study conducted in 2020 investigated the anti-inflammatory effects of licorice extract, which may have implications for respiratory conditions like chronic obstructive pulmonary (COPD)[6]. While this study focuses on chronic obstructive pulmonary disease and not asthma it can still be noted that it may have implications for various respiratory conditions. However, it's essential to use licorice under the guidance of a healthcare professional, as excessive consumption can lead to side effects, including increased blood pressure and hypokalemia.

Butterbur (Petasites hybridus)

Is a plant that has been investigated for its potential in managing asthma symptoms[7]. Some studies suggest that butterbur extract may have bronchodilator effects, which can help relax the airway muscles and improve airflow.

In 2004, a trial was opened to investigate the effects of Petasites on asthma and the study suggested that the Petadolex extract from Butterbar is effective on asthma[8]. However, more research is needed to confirm its efficacy and safety in asthma management. It's important to use butterbur products that are free of pyrrolizidine alkaloids, which can be toxic to the liver.

Objectives of the Study

This study aimed to evaluate pharmacy students' knowledge and perceptions regarding the use of herbal remedies. Specifically, Boswellia, Eucalyptus, Licorice Root, and Butterbur in the management of asthma. Additionally, the study sought to identify gaps between perceived effectiveness and evidence-based understanding of these therapies. A secondary objective was to assess whether students recognize the role of herbal remedies as complementary rather than alternative treatments to conventional asthma pharmacotherapy.

Previous studies have explored knowledge and perceptions of complementary and alternative medicine (CAM) among healthcare students and professionals. Research by Bakare O et al. demonstrated that pharmacy students often exhibit moderate awareness of herbal therapies but may hold misconceptions regarding their safety and clinical efficacy. Similarly, Tadele B and Hailemeskel B reported that while students show strong interest in herbal remedies, gaps persist in understanding appropriate use and potential risks.

In respiratory conditions, limited but growing evidence supports the use of certain herbal agents. Studies investigating Boswellia and Eucalyptus have demonstrated anti-inflammatory and bronchodilatory properties; however, these findings are often derived from small clinical trials or extrapolated from related respiratory conditions. Additionally, variability in product formulation, dosing, and regulatory oversight contributes to inconsistent clinical outcomes.

Despite increasing public interest in herbal medicine, there remains a lack of comprehensive data evaluating pharmacy students' understanding of herbal remedies in asthma management. Given the potential risks associated with inappropriate substitution of conventional therapy, it

is essential to assess both knowledge and perceptions to guide future educational interventions.

METHODS

The survey conducted was an integral part of the Drug Information course, a mandatory module for first-year professional pharmacy students. The course curriculum aimed to instruct students on research methodologies and survey administration. Each student was given an individual topic and tasked with formulating an introduction, along with developing two sets of survey questions. The first set of questions focused on assessing knowledge and comprised 5 inquiries, while the second set concentrated on opinions and consisted of 5 questions.

These questions were embedded into an online survey platform, and all students were encouraged to partake in responding to them. Subsequently, a descriptive statistical analysis was performed on the collected data. Following this analysis, the findings were circulated among the students. They were requested to incorporate these outcomes into their respective research papers, particularly in completing the discussion, conclusion, and abstract sections.

RESULTS

The data presented in Table 1 summarize the gender, age distribution, and geographic backgrounds of the survey participants. A total of 28 respondents were included in the analysis. The majority of participants identified as female (75%), while (25%) identified as male. In terms of age distribution, participants represented a range of age groups, with most falling within the 18-24 years (46.6%) and 24-30 years (39.3%) categories. Smaller proportions were observed in the 30-40 years (10.7%) and above 40 years (3.6%) groups.

Regarding geographic location prior to joining the Howard University College of Pharmacy Program, respondents came from various locations. The largest proportions originating from other states (46.4%), followed by Maryland (32.1%), Washington DC (17.9%), and Virginia (3.6%).

Table 1: Demographic Characteristics of Participants (N=28)

Variables		**(N %)**
Gender	Male	7 (25)
	Female	21 (75)
Age Group (Years)	• 18-24	13 (46.4)
	• 24-30	11 (39.3)

	• 30-40	3 (10.7)
	• Above 40	1 (3.6)
State you have lived before coming to Howard Pharmacy Program	Washington, DC	5 (17.9)
	Maryland	9 (32.1)
	Virginia	1 (3.6)
	Other States	13 (46.4)

As shown in Table 2, among the 28 respondents, the data provided insights into participants' work experience and education backgrounds prior to joining the Pharmacy program at Howard University. When it comes to work experience, participants were evenly distributed between those with 1-2 years (35.7%) and those with 5 or more years (35.7%) of paid employment, while 28.6% reported having 3-4 years of work experience. Regarding the type of work experience, half of respondents (50%) reported having pharmacy-related work experience.

Additionally, 21.4 % had work experience in non-pharmacy but other health-related fields, while 28.6% had non-health-related work experience. For the educational backgrounds, the majority of participants held a Bachelor of Science or Bachelor of Arts (BSc/BA) degree (60.7%). This was followed by those with a Master of Science (MSc) degree (21.4%), pre-pharmacy experience (14.3%), and a small percentage with an associate degree (3.6%). These findings offer a snapshot of the work experience and academic backgrounds of the surveyed individuals, providing valuable context for their pursuit of a pharmacy education.

Table 2: Work and Educational Background of the Participants

	N=28	**(N %)**
How many years have you had a paying job before joining the Pharmacy program at Howard?	• 1-2	10 (35.7)
	• 3-4	8 (28.6)
	• 5 or more	10 (35.7)
What kind of work have you had?	Pharmacy Related	14 (50)
	Non-Pharmacy but Other Health Related	6 (21.4)
	Non-Health Related	8 (28.6)
What is the highest educational level you have achieved before joining the Pharmacy Program at Howard?	Pre-Pharmacy	4 (14.3)
	Associate degree	1 (3.6)
	BSc/BA	17 (60.7)
	MSc	6 (21.4)

Table 3 summarizes participants' knowledge regarding the use of herbal remedies in asthma management. A majority of respondents correctly identified that Eucalyptus can be beneficial

in alleviating asthma symptoms and improving breathing (75.0%). Similarly, 82.1% correctly recognized that Licorice Root is widely regarded as a natural remedy for asthma, and 89.3% correctly acknowledged that Butterbur contains small levels of toxic compounds known as pyrrolizidine alkaloids.

However, knowledge gaps were observed in other areas. Only 46.4% of participants correctly identified that complementary therapies such as Boswellia, Eucalyptus, Licorice Root, and Butterbur cannot replace conventional asthma medications for long-term management. Additionally, 42.9% correctly recognized that Boswellia has not been scientifically proven to effectively treat asthma symptoms.

Overall, the average knowledge score among participants was 67.14%, indicating a moderate level of understanding, with stronger knowledge in identifying commonly recognized herbal uses and safety concerns, but weaker understanding regarding evidence-based effectiveness and appropriate clinical use.

Table 3: Knowledge-Based Responses on Herbal Remedies for Asthma.

Knowledge Statement	Correct Answer	Participants with Correct Answer (N %)
Eucalyptus can be beneficial in alleviating asthma symptoms and improving breathing.	TRUE	21 (75.0)
Licorice Root is widely recognized as a natural remedy for managing asthma.	TRUE	23 (82.1)
Butterbur contains small levels of toxic compound called pyrrolizidine alkaloids.	TRUE	25 (89.3)
Complementary therapies like Boswellia, Eucalyptus, Licorice Root, and Butterbur can replace conventional asthma medications for long-term asthma management.	FALSE	13 (46.4)
Boswellia has been scientifically proven to effectively treat asthma symptoms.	FALSE	12 (42.9)
AVERAGE KNOWLEDGE SCORE:		67.14%

Table 4 summarizes participants' perceptions regarding the use of herbal remedies in asthma management. A large majority of respondents (92.8%) either agreed or strongly agreed that Boswellia has been scientifically proven to effectively treat asthma symptoms. While this reflects a strong positive perception, it highlights a potential overestimation of the current evidence supporting its efficacy. Similarly, 82.1% of participants agreed or strongly agreed that Eucalyptus can help alleviate asthma symptoms and improve lung function. This

favorable perception aligns with its traditional use; however, further research is needed to substantiate its clinical effectiveness.

Responses regarding Licorice Root were more varied, with 64.3% of participants expressing agreement or strong agreement, while 35.7% disagreed. This distribution indicates mixed perceptions about its role in asthma management and suggests uncertainty or differing levels of knowledge among respondents. A majority of respondents (82.1%) agreed or strongly agreed that Butterbur is a well-established herbal treatment for asthma. Although Butterbur has demonstrated potential benefits, the characterization of it as "well-established" may not fully reflect the current state of scientific evidence.

Lastly, 75.0% of participants agreed or strongly agreed that complementary therapies such as Boswellia, Eucalyptus, Licorice Root, and Butterbur can replace conventional asthma medications for long-term management. This finding raises important concerns regarding misconceptions about the role of herbal therapies and underscores the need for improved education on their use as complementary, rather than substitutive, treatments.

Table 4: Opinion-Based Responses on Herbal Remedies for Asthma

Opinion Statement	Agree (N%)	Disagree (N%)	Mean	STD	Variance
Boswellia has been scientifically proven to effectively treat asthma symptoms.	26 (92.8%)	2 (7.2%)	3.21	0.68	0.46
Eucalyptus can help alleviate asthma symptoms and improve lung function.	23 (82.1%)	5 (17.9%)	3.11	0.78	0.61
Licorice Root as a natural remedy for asthma.	18 (64.3%)	10 (35.7%)	2.93	0.79	0.62
Butterbur is a well-established herbal treatment for asthma.	23 (82.1%)	5 (17.8%)	3.00	0.88	0.77
Complementary therapies like Boswellia, Eucalyptus, Licorice Root, and Butterbur can replace conventional asthma medications for long-term management.	21 (75.0%)	7 (25.0%)	3.11	0.77	0.59

DISCUSSION

This study evaluated pharmacy students' knowledge and perceptions regarding the use of herbal remedies in asthma management and revealed a notable discrepancy between knowledge and beliefs. While participants demonstrated moderate knowledge overall (average score: 67.14%), important gaps were identified, particularly regarding the evidence-based role of herbal therapies.

Students showed strong awareness of commonly recognized herbal remedies and safety concerns, as seen with high correct responses for Eucalyptus (75.0%), Licorice Root (82.1%),

and Butterbur toxicity (89.3%). However, less than half correctly identified that herbal therapies cannot replace conventional asthma medications (46.4%) and that Boswellia lacks conclusive scientific evidence (42.9%). These findings suggest that while general familiarity with herbal remedies exists, understanding of their clinical limitations remains insufficient.

This gap was further emphasized in the opinion-based responses, where a large majority of participants expressed strong belief in the effectiveness of herbal therapies. Notably, 92.8% agreed or strongly agreed that Boswellia is scientifically proven for asthma treatment, despite limited supporting evidence. Similarly, 75.0% believed that complementary therapies could replace conventional medications, highlighting a critical misconception.

These findings are consistent with broader trends in complementary and alternative medicine (CAM), where positive perceptions often exceed the strength of clinical evidence. While some herbal remedies such as Boswellia, Eucalyptus, Licorice Root, and Butterbur have demonstrated anti-inflammatory or bronchodilatory properties, current research remains limited, and safety concerns such as pyrrolizidine alkaloid toxicity in Butterbur must be considered.

The results underscore the need for enhanced education within pharmacy curricula, particularly focusing on critical appraisal of evidence, appropriate integration of CAM therapies, and patient counseling. As future healthcare providers, pharmacy students must be equipped to distinguish between traditional use and scientifically validated therapies to ensure safe and effective patient care.

This study has several limitations that should be considered when interpreting the findings. First, the sample size was relatively small (N=28), which may limit the generalizability of the results to a broader population of pharmacy students or other healthcare professionals. Second, the study was conducted at a single institution, which may introduce institutional bias and limit external validity.

Additionally, the use of a cross-sectional survey design captures responses at only one point in time and does not account for changes in knowledge or perceptions over time. The reliance on self-reported data may also introduce response bias, including social desirability bias, where participants may provide answers they perceive as favorable rather than their true beliefs.

Furthermore, the survey instrument consisted of a limited number of knowledge-based and opinion-based questions, which may not fully capture the depth and complexity of students' understanding of herbal remedies in asthma management. There is also the potential for variability in interpretation of survey questions among participants.

Lastly, the study did not assess actual clinical behavior or decision-making, and therefore, conclusions regarding how these perceptions influence real-world practice cannot be determined. Future studies with larger, more diverse populations and validated survey tools are needed to strengthen the evidence in this area.

CONCLUSION

This study highlights a significant gap between pharmacy students' knowledge and perceptions of herbal remedies in asthma management. Although students demonstrated basic awareness of herbal therapies, many overestimated their effectiveness and misunderstood their role in clinical practice. Misconceptions regarding the replacement of conventional asthma treatments with herbal remedies emphasize the need for stronger emphasis on evidence-based practice and patient safety in pharmacy education. Future efforts should focus on integrating CAM education into curricula to promote informed decision-making and appropriate use of complementary therapies. Ultimately, herbal remedies should be viewed as adjuncts rather than substitutes for standard asthma treatments, with clinical decisions guided by evidence, safety considerations, and collaboration with healthcare professionals.

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