

(RESEARCH ARTICLE)



Anti-premenstrual syndrome (PMS) properties of chaste tree berry (vitex), evening primrose oil, dandelion tea, and lavender aromatherapy: Assessing pharmacy students' knowledge and opinions

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Abstract

Chaste Tree Berry has been commercialized for treating premenstrual mastodynia. Evening Primrose Oil, rich in gamma-linolenic acid, has been reported to alleviate inflammation associated with PMS. Dandelion Tea, packed with antioxidants, has been reported to have some diuretic properties which may help reduce bloating, while Lavender Aromatherapy has been claimed to calm PMS-related mood symptoms. A literature search was done to investigate the claims attributed to these plants on their use to manage PMS symptoms. This study, conducted as part of a Drug Information course for first-year pharmacy students, also employed a survey approach to determine the knowledge level and opinion of first year pharmacy students on herb-based treatment of PMS symptoms. Demographic data recorded varied backgrounds of 39 survey participants. Students formulated knowledge-based and opinion-based questions, with responses categorized as "True" or "False." Knowledge-based questions demonstrated a moderate average 58.9% correct response rate. Opinion-based questions revealed a prevailing positive average agreement of about 83% on the potential benefits of Chaste Tree Berry, Evening Primrose Oil, Dandelion Tea, and Lavender Aromatherapy. This research provided insights into pharmacy students' perspectives on herbal remedies for PMS. The positive consensus on potential benefits highlights the relevance of these remedies in managing PMS symptoms. Knowledge gaps and varying opinions indicate a nuanced landscape requiring further studies and education initiatives. Ongoing research and education can enhance understanding, guide evidence-based recommendations, and empower individuals in managing PMS.

Keywords: Premenstrual Syndrome; Chaste Tree Berry; Evening Primrose Oil; Dandelion Tea; Lavender Aromatherapy; Survey

1 Introduction

Disease Mechanism, Prevalence, and Impact: Premenstrual Syndrome (PMS) is a common yet multifaceted condition that presents in young and middle-aged women all over the world. PMS can manifest in a variety of ways and is characterized by emotional and physical symptoms that occur during the luteal phase of the menstrual cycle. Fluctuations in estrogen and progesterone levels occur in the latter half of the menstrual cycle and are believed to play a significant role in the range of symptoms experienced by different women. Some may be more sensitive to these hormonal changes while others are not. PMS symptoms are usually related to irritability, anxiety, and mood. Heightened sensitivity to pain, high levels of stress, certain psychological factors, poor diet, lack of exercise, and inadequate nutrition can all either influence or exacerbate PMS symptoms [1].

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Established studies show that an estimated 90% of females of reproductive age are impacted by mild to acute premenstrual symptoms. Among them, about 20% to 40% encounter PMS, and 2% to 8% experience Premenstrual Dysphoric Disorder (PMDD), a more severe form of PMS characterized by significant emotional and physical symptoms. The PMDD prevalence differs based on culture, as well as ethnic group, while PMS prevalence varies with factors such as age, whether a person has given birth, and environmental and genetic factors. Some women may not experience any symptoms, but other individuals can experience effects that significantly impact their daily lives or the symptoms can be quite debilitating [2].

1.1 Review of Herbs

Chaste Tree Berry (CTB): The dried fruits of the chaste tree, *Vitex agnus castus* (VAC), were traditionally used by monks as a substitute for pepper, and for over the last 50 years, it has been commercially provided for the treatment of premenstrual symptoms, particularly to prevent prolactin-induced premenstrual mastodynia (mastalgia). In 2003, a double-blind placebo-controlled study was conducted to determine whether one of the most common premenstrual symptoms, mastodynia could be treated with VAC. The study indicated that since serum prolactin levels were found to be reduced in the patients treated with the extract it could be concluded that VAC is beneficial in the treatment of PMS symptoms [3].

Evening Primrose Oil (EPO): Evening Primrose Oil, *Oenothera biennis*, is known to contain gamma-linolenic acid (GLA), an essential fatty acid, that may help alleviate PMS symptoms by reducing inflammation. Although multiple studies have been done on the effect of evening primrose oil on PMS symptoms, it has not yet been demonstrated to be consistently effective in reducing the symptoms [4]. An observational study published in 2023 compared the effects of Danazol and evening primrose oil on women who reported experiencing premenstrual mastalgia. The candidates were selected on a double-blind basis and, coinciding with the inclusion criteria, were administered danazol and evening primrose oil in divided doses for 6 weeks and they were assessed for pain alleviation. The results indicated that Danazol is significantly effective in the management of mastalgia as compared to the efficacy of evening primrose oil [5].

Dandelion Tea: Dandelion tea is packed with antioxidants which are compounds that help protect cells from damage caused by harmful molecules known as free radicals. Antioxidants are essential for maintaining overall health and may also act as a mild laxative, helping to relieve constipation and promote regular bowel movements. In a pilot study, an extract of the medicinal plant *T. officinale* (dandelion) was ingested by volunteers to investigate whether the ingestion increased urinary frequency and volume. At the conclusion of the study, it was reported that for the entire population ($n = 17$), there was a significant ($p < 0.05$) increase in the frequency of urination in the 5 hours after the first dose [6]. This study demonstrates how dandelion tea is believed to have diuretic properties, which may help reduce bloating and water retention associated with PMS.

Lavender Aromatherapy: Aromatherapy using lavender essential oil is believed to have calming and stress-reducing effects, which may help alleviate mood-related symptoms of PMS. A randomized controlled trial conducted in 2017, aimed to determine the effect of lavender oil aromatherapy on coping with premenstrual syndrome in university students. Data was collected from a total of 73 students by questionnaire form and PMS scale, and the method of inhalation aromatherapy by lavender oil was applied for 5 sessions on average for 3 cycles. There was a statistically significant difference between the intervention and control groups ($p < 0.05$), and a statistically significant difference between the groups in terms of the PMS scale and sub-dimensions of anxiety, depressive affect, nervousness, pain, bloating, and depressive thoughts. It was concluded that inhalation aromatherapy can be useful in coping with PMS [7].

1.2 Pharmacy Students' Knowledge & Opinions

In a series of recent papers, from the same pool of survey participants as used in this study, the knowledge levels, and opinions of pharmacy students about selected herbal products were reported. In each of the surveys, the respective knowledge levels were found to be 53.5% [8], 69.1% [9], 72.6% [10] and 75.9% [11]. In the current survey, the knowledge levels, and views on the use of four further herbal products for PMS are examined. Chasteberry, evening primrose oil, dandelion and lavender are among 62 natural products for which claims of benefit in the management of PMS and/or PMDD have been made in the literature. Randomized controlled trials have been reported for chasteberry, evening primrose oil [12]. Many healthcare professionals have mixed opinions on the effectiveness of herbal remedies based on the studies published over the years. While some may recommend CTB, EPO, Dandelion tea, and lavender aromatherapy as complementary therapy for PMS, others advise use with caution due to the limited conclusive scientific evidence. More specifically, with the use of EPO, some healthcare professionals may recommend it as a supplement to help manage symptoms. However, it is important to note that studies on its effectiveness have produced mixed results. While dandelion tea is considered safe and may be included as part of a balanced diet, healthcare professionals view its effectiveness for managing PMS symptoms as limited compared to other interventions. Additionally, regarding lavender

aromatherapy, healthcare professionals recognize its benefit for relaxation and stress relief and recommend it particularly for emotional well-being.

1.3 Literature Gap, Study Objective & Impact

While there is some literature on the use of these natural remedies for PMS, there are gaps in terms of rigorous, large-scale clinical trials and studies that provide definitive evidence of their effectiveness. Individual responses to these different remedies vary, thus making it difficult to determine what works for everyone. To address this literature gap, the objective of this study is to conduct a comprehensive review of the literature to uncover whether females with PMS are more likely to benefit from these natural remedies. For example, some remedies may be more effective for specific PMS symptoms or in certain hormonal contexts. By addressing this literature gap, the study can further clarify whether these natural remedies have a significant impact on alleviating PMS symptoms. Furthermore, a survey conducted among pharmacy students can also elicit their baseline knowledge and improve their deficit to advise patients about alternative or complementary treatments for PMS by relying on scientific evidence. Further research could shed light on the underlying mechanisms through which these remedies may exert their effects and how to use them alongside conventional treatments. With solid scientific evidence, individuals dealing with PMS could make more informed decisions about their treatment options— leading to increased autonomy and empowerment in managing their own health.

2 Methods

As part of the Drug Information course, a 2-credit-hour class for first-year professional pharmacy students, this survey was initiated. Within the course, students received comprehensive instruction on research methodology and survey administration. Each student was individually assigned a topic and tasked with formulating an introduction, as well as developing two sets of survey questions. A Likert scale was used to score responses for the opinion-based statements: 4=strongly agree; 3=agree; 2=disagree; 1=strongly disagree. Mean, standard deviation, and variance were computed for each of the responses and for the cumulative response. The first set comprised 5 knowledge-based questions, while the second set encompassed 5 opinion-based questions. These questions were then incorporated into an online survey, and all students were encouraged to participate. Following the collection of data, a descriptive statistical analysis was carried out, and the resulting findings were disseminated to the students. Subsequently, students were required to integrate these results into their research papers, contributing specifically to the discussion, conclusion, and abstract sections.

3 Results

3.1 Demographics

The data in Table 1 contains information on the gender, age distribution, and geographical backgrounds of the survey participants. There was a total of 39 respondents, with approximately one-third (25.6%) identifying as male and 74.36% as female. When considering age, a range of age groups is represented, with the majority falling into the 18-24 (51.3%) and 24-30 (38.5%) categories. Smaller percentages include those in the 30-34 age range (7.7%) and those above 40 (2.6%). The residency locations of respondents prior to enrolling in the Howard Pharmacy Program reveal a varied distribution. 15.8% indicated residency in Washington, D.C., 39.5% in Maryland, 2.6% in Virginia, and with the largest contingent, accounting for 42.1%, coming from various other states.

Table 1 Demographic data of participants

Demographics		N=39 (%)
Gender	Male	10 (25.64)
	Female	29 (74.36)
Age (Years)	18-24	20 (51.28)
	24-30	15 (38.46)
	30-40	3 (7.69)
	Above 40	1 (2.56)

State lived in prior to starting Howard University College of Pharmacy	Washington, D.C.	6 (15.79)
	Maryland	15 (39.47)
	Virginia	1 (26.3)
	Other States	16 (42.11)

3.2 Participants' work and educational background:

The data provides insight into the professional and educational backgrounds of the 39 respondents prior to enrolling in the pharmacy program at Howard University. In terms of work experience, more than half of the respondents (54.1%) had employment directly related to pharmacy, while 24.3% were engaged in non-pharmacy health-related fields, and 21.6% held jobs unrelated to health. Concerning their highest educational levels, a substantial majority (66.7%) held a Bachelor of Science (BSc) or Bachelor of Arts (BA) degree. Additionally, 17.9% held a Master of Science (MSc) degree, 10.3% completed some pre-pharmacy or college coursework, and only 2 respondents (5.1%) had an Associate degree. These findings provide a snapshot of the professional and academic backgrounds of the surveyed individuals, contributing valuable context for their decision to pursue 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 University?	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 University?	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 another Doctoral Degree	0 (0.0)

3.3 Knowledge-based questions

Table 3 presents an analysis of knowledge-based questions related to Premenstrual Syndrome (PMS) and its associated symptoms. The responses are categorized as "True" and "False," accompanied by statistical measures such as mean, standard deviation (STD), and variance. On average, just over half (58%) of the participants gave correct answers to the knowledge-based questions. This suggests a moderate level of accuracy among the surveyed individuals.

Question 1 is the questions with the highest correct response rate pertains to the onset of premenstrual symptoms, with an impressive 88.6% of respondents providing an accurate answer. PMS begins approximately one week before

menstruation. This timing corresponds with the luteal phase of the menstrual cycle, during which estrogen and progesterone levels first rise and then fall sharply. These hormonal changes are believed to trigger the various symptoms of PMS, such as mood swings, bloating, and headaches. Most women experience these symptoms in the week leading up to their period, aligning with clinical definitions and observations of PMS. Symptoms typically resolve with the onset of menstrual flow or shortly thereafter, which further supports the timing specified in the statement [13].

Conversely, Question 3, addressing the consistent effectiveness of evening primrose oil in reducing PMS symptoms, exhibited the lowest accuracy, with only 17.1% of participants answering correctly. The efficacy of evening primrose oil in reducing PMS symptoms is subject to ongoing debate. While it contains gamma-linolenic acid, which is believed to impact prostaglandin synthesis and potentially alleviate hormonal symptoms like breast tenderness and mood swings, scientific evidence remains mixed. A systematic review highlighted that many studies found no significant improvement in PMS symptoms when compared to a placebo, suggesting that the effectiveness of evening primrose oil may not be consistently reliable [13].

Question 5 saw incorrect responses from 27 out of 35 individuals (77.1%). Studies indicate that the inhalation of lavender oil can reduce anxiety and improve mood, potentially decreasing the emotional fluctuations associated with PMS. The relaxation effects of lavender are thought to moderate sympathetic nervous system activity, which is often heightened during the premenstrual phase, leading to improvements in overall emotional well-being during this period [14].

Questions 2 received notably high scores, 80%. Chaste Tree Berry (*Vitex agnus-castus*) extracts are recognized for their effectiveness in improving PMS such as mastodynia (breast pain), premenstrual dysphoric disorder (PMDD), and latent hyperprolactinemia. Studies indicate that Chaste Tree Berry influences the pituitary gland to regulate prolactin levels, which in turn helps alleviate cyclic breast pain and mood alterations associated with PMDD. It is also effective in normalizing prolactin levels, addressing issues related to latent hyperprolactinemia, such as irregular menstrual cycles. This efficacy is documented in various clinical trials, supporting its use in managing these specific premenstrual symptoms [15, 16].

Question 4 received notably high scores, 85.7%. Dandelion tea is commonly believed to possess diuretic properties, which can help reduce water retention and bloating, often experienced during PMS. The natural compounds in dandelion, particularly potassium and caffeoylquinic acids, are thought to encourage increased urine production, thereby helping to alleviate symptoms of fluid retention. This potential benefit of dandelion tea makes it a popular herbal remedy for those seeking natural ways to manage bloating [6].

The standard deviation (STD) of 0.3735 implies that the correctness percentages are relatively close to the mean. The low variance of 0.1439 indicates a limited dispersion of data points around the mean. This suggests a consistent trend in responses, reflecting a high level of agreement with the provided statements. The majority participants align with the true statements, resulting in a high mean correctness percentage and low variability.

Table 3 The results of the knowledge-based questions

Questions	Correct Answer	True (n)	False (n)	Participants with correct answers [n (%)]	Mean correct answer rate (\pm SD) out of 1	Variance
Premenstrual syndrome (PMS) is a health problem that begins approximately one week before menstruation	True	31	4	31 (88.6)	0.8857 \pm 0.3182	0.1012
Chaste Tree Berry extracts are known to improve premenstrual symptoms including mastodynia, premenstrual dysphonic disorder, and latent hyperprolactinemia.	True	28	7	28 (80.0)	0.8 \pm 0.4058	0.1647
Evening primrose oil has been demonstrated to be consistently	False	29	6	6 (17.1)	0.1714 \pm 0.3824	0.1462

effective in reducing the symptoms of PMS						
Dandelion tea is believed to have diuretic properties to help reduce water retention and bloating	True	30	5	30 (85.7)	0.8571±0.3550	0.1261
Lavender aromatherapy could alleviate premenstrual emotional symptoms, which are attributable to improvement of sympathetic nervous system activity	False	27	8	8 (22.9)	0.2286±0.4260	0.1815
Average Correct answer				58.9%	0.5886±0.3735	0.1439

3.4 Opinion-based questions

Figure 1 summarizes the responses, while Table 4 a comprehensive summary of responses to opinion-based questions from the survey participants, shedding light on their attitudes toward herbal remedies for PMS. The findings indicate a prevailing positive agreement among respondents regarding the potential benefits of these remedies. Over 85% of participants strongly agreed or agreed that PMS can significantly impact women's daily activities, academic performances, and overall quality of life. The mean Likert score of 3.3235 suggests a relatively high level of agreement among respondents on this aspect.

A similar percentage (82.8%) expressed agreement on the potential of aromatherapy with lavender to alleviate premenstrual symptoms, indicating a positive outlook on this therapeutic modality. The mean Likert score of 3.2286 reflects a moderate level of agreement regarding its benefits for relieving symptoms associated with bowel movements.

Close to 83% of respondents agreed that the antioxidants present in dandelion tea have the potential to relieve PMS symptoms related to bowel movements. This aligns with a mean Likert score of 3.5714, indicating a strong level of agreement on the effectiveness of dandelion tea in reducing symptoms associated with bowel movements.

Moreover, around 85% of participants believed in the potential of inhalation therapy to decrease a range of PMS symptoms, including anxiety, depression affect and thoughts, nervousness, pain, and bloating. The mean Likert score of 3.3429 suggests a relatively high level of agreement on the benefits of inhalation therapy. Concerning the effectiveness of Evening Primrose Oil (EPO) in reducing PMS symptoms, approximately 77% of respondents agreed. However, opinions on this herbal remedy were more divided, as reflected in the mean score of 3.1429, indicating a range of views among participants.

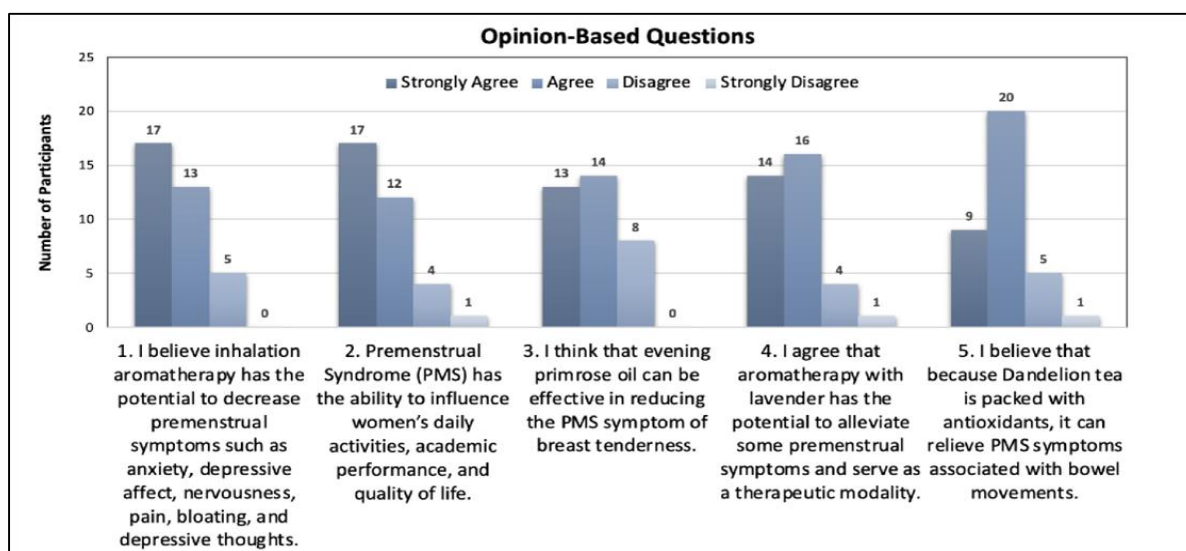


Figure 1 Results of the opinion-based questions

The percentage of respondents who strongly disagreed or disagreed with the statements ranged from 0% to 23%. This indicates a notable inclination towards positive agreement regarding the benefits of herbal remedies for PMS, reflected in the total average of 83.4% with an average Likert score of 3.3219. The standard deviations and variances across questions reflect the spread and distribution of opinions among the respondents, emphasizing the variability in perspectives.

Table 4 Opinion-based questions ($n=35$, except for 2))

#	Statements	SA (n, %)	Agree (n, %)	DA (n, %)	SDA (n, %)	Mean LK±SD	Variance
1	I believe inhalation aromatherapy has the potential to decrease premenstrual symptoms, such as anxiety, depressive affect, nervousness, pain bloating, and depressive thoughts	17 (48.6)	13 (37.1)	5 (14.3)	0 (0)	3.3429±0.7149	0.5110
2	Premenstrual syndrome (PMS) can influence women's daily activities, academic performance, and quality of life	17 (50.0)	12 (35.3)	4 (11.8)	1 (2.9)	3.3235±0.7941	0.6306
3	I think that evening primrose oil can be effective in reducing the PMS symptoms of breast tenderness	13 (37.1)	14 (40)	8 (22.9)	0 (0)	3.1429±0.7613	0.5796
4	I agree that aromatherapy with lavender has the potential to alleviate some premenstrual symptoms and serve as a therapeutic modality	14 (40)	16 (45.7)	4 (11.4)	1 (2.9)	3.2286±0.7592	0.5763
5	I believe that because dandelion tea is packed with antioxidants, it can relieve PMS symptoms associated with bowel movements.	9 (25.7)	20 (57.1)	5 (14.3)	1 (2.9)	3.5714±0.7149	0.5110
	Average	40.3%	43.1%	14.9%	1.7%	3.3219±0.7489	0.5617

4 Discussion

The study provides data the knowledge and attitudes first-year pharmacy students toward herbal remedies for managing PMS symptoms. The participants, primarily first-year pharmacy students, exhibited a generally positive attitude towards herbal remedies, with notable consensus on the potential benefits of Chaste Tree Berry, Evening Primrose Oil, Dandelion tea, and Lavender aromatherapy. While answers to knowledge-based questions demonstrated mixed accuracy, the positive inclination towards these remedies in opinion-based responses indicates a potential acceptance among future healthcare professionals.

The knowledge-based questions revealed variations in accuracy, particularly with the question on Evening Primrose Oil showing the lowest correct responses at 17.1%. This suggests a gap in understanding the effectiveness of specific herbal remedies, emphasizing the need for targeted education and training in this domain. The observed positive attitude, despite knowledge gaps, underscores the influence of perceptions and beliefs in shaping healthcare professionals' views on herbal interventions.

Differences in the perceived effectiveness of herbal remedies were evident in the opinion-based responses. For instance, while there was a strong consensus on the potential benefits of inhalation therapy and Lavender aromatherapy, opinions on Evening Primrose Oil were more divided. This variability might stem from the existing ambiguity in the scientific literature regarding the consistent effectiveness of certain herbal remedies, as highlighted in the review of Chaste Tree Berry and Evening Primrose Oil studies.

The study acknowledges its limitations, notably the small sample size and lack of diversity among participants. Recognizing these constraints is crucial for interpreting the findings accurately. Future research endeavors should aim for larger and more diverse participant groups to enhance the generalizability of the results. Additionally, exploring factors beyond knowledge and attitudes, such as cultural influences and personal experiences, could provide a more comprehensive understanding of healthcare professionals' perspectives on herbal remedies for PMS.

5 Conclusion

This research sheds light on the current state of HU first-year pharmacy students' perspectives on herbal remedies for PMS. The positive consensus on the potential benefits of Chaste Tree Berry, Evening Primrose Oil, Dandelion tea, and Lavender aromatherapy underscores their perceived relevance in managing PMS symptoms. Despite variations in knowledge accuracy, the positive attitude among participants highlights a willingness to consider herbal interventions in PMS management.

The limitations of this survey include the small sample size and lack of diversity. Future research should strive for larger, diverse participant groups and explore additional factors influencing perceptions. Also, a concerted effort to conduct rigorous, large-scale clinical trials could provide conclusive evidence on the effectiveness of herbal remedies for PMS, addressing the existing literature gap and guiding evidence-based practice.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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