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DULL SKIN: EFFICACY OF HERBAL REMEDIES AND PHARMACY STUDENTS' KNOWLEDGE AND PERCEPTIONS – A CROSS-SECTIONAL SURVEY

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ABSTRACT

Dull skin refers to a complexion that lacks radiance, appearing lackluster, tired, or lacking in vibrancy. This can be caused by various factors such as dryness, buildup of dead skin cells, or a decrease in skin cell turnover. This paper discusses the potential use of Turmeric Face Mask, Lemon Juice, and Papaya Enzyme Mask to aid in improving dull skin. **Methods:** To assess healthcare professional's knowledge and opinions, a survey was conducted in first-year pharmacy students. The survey included 5 knowledge-based and 5 opinion-based questions. The questions focused on three different herbal remedies. The data collected from 40 participants was analyzed for correctness and agreement. **Results:** The knowledge-based questions show that 95% answered correctly with the question about accumulation of dead skin cells. Vitamin A comes from lemon juice and receives the lowest accuracy (37.5%). For the opinion-based questions, it shows more than 95% of participants agreed or strongly agreed using a turmeric face mask can aid in reducing inflammation of the skin. **Discussion:** Participants display a higher attitude towards herbal remedies for dull skin. The knowledge base questions have mixed accuracy. In addition, participants agreed on the use of herbal remedies for dull skin. Disagreement was minimal. Ranging from 0% to 9% which shows an extensive preference towards positive agreement. **Conclusion:** This research paper delivers information of the use of herbal remedies for dull skin. Opinions about Turmeric Face Mask, Papaya Enzyme Mask, and Lemon Juice are positive in the views of healthcare professionals.

The study is constrained by a restricted sample size and lack of diversity amount the individuals surveyed. To advance the filed, forthcoming research endeavors out to rectify these shortcomings by expanding the sample size and ensuring a more varied representation of participants. Additionally, future investigations should delve into supplementary factors that impact people's knowledge and attitudes toward herbal remedies for skin care.

KEYWORDS: Dull Skin, Turmeric Face Mask, Lemon Juice, Papaya Enzyme Mask, Vitamin A.

INTRODUCTION

Dull skin refers to the lack of brightness, radiance, and healthy glow on the skin. Majority of times, dull skin can appear, dry lackluster, and even ash which can result in dullness and uneven skin texture. Several factors can contribute to having dull skin include dead skin cells, dehydration, poor circulation, sun damage, age, and unhealthy lifestyle (poor diet, lack of exercise, smoking, and lack of sleep).

Dull skin is a concern affecting individuals of various ages and skin types. The impact of dull skin extends beyond aesthetic concerns, influencing one's overall self-confidence and well-being. A lackluster complexion can make individuals appear fatigued or older than they feel, impacting their social and professional interactions. Fortunately, the beauty and skin care industry offer a variety of products and treatments aimed at addressing dullness.

Herb Review

Turmeric Face Mask: Turmeric is a staple spice in the kitchen. With its yellow vibrant color, it has gained a reputation in the beauty world to aid in skin glowing. In addition, there are other benefits of a turmeric face mask. Turmeric can help with anti-inflammatory properties, helps treat acne, reduces sign of aging by reducing wrinkles and fine line. Lastly, turmeric is beneficial for brightening dark undereye circles.

In 2016, a study was published about the safety and efficacy of Purifying Neem Face Wash (PNFW).[1] The study was conducted on individuals who either have moderate-to-mild acne or oily skin. The objective of using PNFW is to reduce inflammation of the skin. The study was conducted on 120 subjects during a four-week clinical study. To safely see the result of subjects, in the reduction of acne, the performance was detected by counting cutaneous

inflammatory and noninflammatory acne lesions. The results show 79% showed reduction in inflammatory and noninflammatory acne lesions.[2]

Papaya Enzyme Mask: A papaya is a natural and effective remedy known for its enhancing effects on the skin. Using a papaya enzyme face mask can result in brighter skin and clearer complexion. Papaya contains an enzyme called papain which is known to exfoliate skin, removing dead cells, and promoting a smoother complexion. In addition, papain works by hydrating the skin leaving a refreshing and rejuvenated feeling after use.

An article published in 2021 discussed the beneficial role of carica papaya. The beneficial role of carcia papaya helps with a variety of conditions including cancer, inflammation, aging, healing of the skin, and lifelong diseases[3]. Carica papaya helps counteract oxidative stress which aids in improving the management of oxidative stress-related conditions. One example is skin aging. Reactive Oxygen Species (ROS) are the reason of skin aging and contribute to oxidative stress and inflammation. The study focused on carica papaya fruit extract against skin aging related endothelial oxidative stress. Injecting an unripe papaya juice into endothelial cells shows to be beneficial in maintaining homeostasis, thus delaying skin aging.

Lemon Juice: Lemon juice is high in vitamin C content which acts as a natural antioxidant offering a degree of protection against free radicals generated by UV radiation. The antioxidant property can contribute to reducing oxidative stress on the skin.

A study published in 2002 discusses how topical use of vitamin C can repair skin photodamage. Ten subjects participated in a double-blind experiment applying a formulated vitamin C complex on one half of the face and an inactive polysilicon gel base on the other side of the face.[4] The results from the study showed when using the vitamin C treatment, a decrease in photoaging scores.

Health Care Professionals Knowledge & Opinions: The study by (Vaughn et al., 2016) discusses the benefits of turmeric for the skin. However, finding the knowledge or opinions from a healthcare professional was not assessable. The studies, Vaughn et al.,2016) and (Kong et al., 2022), discuss the use of turmeric, papaya, and lemon juice for other diseases.[2]

Literature Gap, Study Objective, and Impact: While numerous studies have demonstrated the clinical benefits and pharmacological properties of herbal agents such as turmeric,

papaya, and lemon in skin health, the current body of literature largely focuses on efficacy and biological mechanisms rather than the perspectives of healthcare professionals. There is already a substantial and well-developed understanding of how future healthcare providers interpret, value, and apply this information in practice. In fact, a growing body of research has thoroughly assessed the knowledge, perceptions, and attitudes of pharmacy students and other healthcare trainees regarding the use of these herbal interventions in skincare, demonstrating that this area is far from underexplored.

This gap is significant because healthcare professionals play a key role in guiding patient decisions and promoting evidence-based practices. Without adequate knowledge or aligned perceptions, there may be inconsistencies in recommendations or underutilization of potentially beneficial therapies.

Therefore, the secondary objective of this study is to assess the knowledge, perceptions, and attitudes of pharmacy students regarding the use of these herbal interventions in skin care. By combining evidence from literature with insights from future healthcare professionals, this study aims to identify existing knowledge gaps, inform educational needs, and support the rational and evidence-based use of herbal products in dermatologic care.

METHODS

This survey was undertaken within the framework of the Drug information course, a compulsory 2-credit-hours module designed for first-year professional pharmacy students. Within this course, students were instructed in research methodology and survey administration. Each student was assigned an individual topic and given the responsibility to formulating an introduction along with developing two sets of survey questions. The initial set comprised 5 knowledge-based questions, while the second set included 5 opinion-based questions. These questions were integrated into an online survey, and all students were invited to participate in providing their responses. Subsequently, a descriptive statistical data analysis was conducted, and the finding were disseminated to the students. Following this, students were required to incorporate these results into their research papers, specifically in the discussion, conclusion, and abstract sections.

RESULTS

The data on table 1 contains information on the gender, age distribution, and geographical backgrounds of the survey participants. There was a total of 40 respondents. 75% identify as

female and 25% identify as males. When considering age, a range of age groups represented, with the majority falling into the 18-24 (52.5%) and 24-30 (37.5%) categories. Smaller percentages include those in the 30-40 age range (7.5%) and above 40 (2.5%) range.

Regarding the states where respondents lived before joining Howard University College of Pharmacy Program, the data indicates diverse origins, with 15% from Washington DC, 37.5% from Maryland, 5% from Virginia, and 42.5% from other states.

Table 1: Demographic data of the participants.

		N = 40 – N (%)
Gender	• Male	10 (25%)
	• Female	30 (75%)
Age (Years)	• 18-24	21 (52.5%)
	• 24-30	15 (37.5%)
	• 30-40	3 (7.5%)
	• Above 40	1 (2.5%)
State you have lived before coming to Howard Pharmacy Program.	• Washington DC	6 (15%)
	• Maryland	15 (37.5%)
	• Virginia	2 (5%)
	• Other States	17 (42.5%)

Data on participants' work experience and educational background were also collected. Among 40 respondents, the data provides insight into their work experience and educational backgrounds before joining Howard University College of Pharmacy Program (Table 2). When it comes to work experience, 50% of respondents had jobs related to pharmacy, while 22.5% worked in nonpharmacy but other health-related fields, and 20% had non-health-related jobs. Regarding the respondents' highest educational level, the majority held a Bachelor of Science (BSc) or Bachelor of Arts (BA) degree, approximately 65%. In the meantime, 17.5% of respondents holds a Master of Science (MSc) degree. In addition, 10% had completed some pre-pharmacy or college work. Lastly, 5% contained an associate degree. These results provide a brief overview of the professional and educational histories of the individuals included in the survey, offering valuable insights into the circumstances surrounding their decision to pursue a pharmacy education.

Table 2: Work and educational background of the participants.

	N =40	N (%)
How many years have you had a paying job before joining the Pharmacy program at Howard?	• Never worked	2 (5%)
	• 1-2	12 (30%)
	• 3-4	9 (22.5%)

	• 5 or more	16 (40%)
What kind of work have you had?	• Pharmacy related	20 (50%)
	• Non-pharmacy but other health related	9 (22.5%)
	• Non-health related	8 (20%)
What is the highest educational level you have achieved before joining the pharmacy program at Howard?	• Pre-Pharmacy or some college work	4 (10%)
	• Associate degree	2 (5%)
	• BSc or BA	26 (65%)
	• MSc	7 (17.5%)
	• PhD or other doctoral degree	0 (0.00%)

Regarding the knowledge-based questions, more than half answered the questions correctly on average (Table 3). When participants were asked the 5 knowledge-based questions, 74.36% of participants answered them correctly. Approximately 26% answered them incorrectly. The question with the highest score pertains to the accumulation of dead skin cells with 95% of respondents answering the question correctly. The question that was answered incorrectly by majority of respondents was question #3 that deals with vitamin A that comes from lemon juice. Only 37.5% answered the question correctly.

The other 2 questions received a high score as well. For Turmeric anti-inflammatory properties, 82.5% of respondents agree with the statement. Concerning the use of papaya for the skin, 82.5% of respondents agreed it is beneficial for soothing skin irritations.

The standard deviation (STD) is 0.37 which indicates the correctness percentages are close to the mean. The variance is 0.144, this suggests the spread of data points around the mean. Since the data shows a low variance, this indicates the correctness percentages are not dispersed widely, resulting in the responses are relatively consistent across the questions. The data indicates a widespread consensus with the given statements, as most responses align accurate statements, The consensus led to a high average correctness percentage and minimal variability.

Table 3 displays inquiries pertaining to diverse skin care subjects, along with the proportion of responses categorized as “True” and “False”. Additionally, it presents the count, mean, standard deviation (STD), and variance for each respective question.

Table 3: The results of the knowledge-based questions (n=40).

Question	Correct Answer	Participants with Correct Answers (%)	True (%)	False (%)	Mean	STD	Variance
1. Accumulation of dead skin cells, environmental pollutants, and lack of radiance are all causes of dull skin	True	38 (95%)	38 (95%)	2 (5%)	1.06	0.23	0.05
2. Using papaya on the skin is known for soothing skin irritations	True	33 (82.5%)	33 (82.5%)	7 (17.5%)	1.175	0.38	0.14
3. Lemon juice is rich in vitamin A	False	25 (62.5%)	25 (62.5%)	15 (37.5%)	1.375	0.47	0.23
4. The purpose of turmeric on dull skin is to revive skin by bringing out the natural glow	True	30 (75%)	30(75%)	10 (25%)	1.25	0.42	0.18
5. Turmeric can be used as an anti-inflammatory and antioxidant property	True	33 (82.5%)	33 (82.5%)	7 (17.5%)	1.175	0.35	0.12
AVERAGE		**74.36%**			**1.207**	**0.37**	**0.144**

Opinion-Based Questions were also collected. Table 4 shows the summary of the data for the opinion-based questions. As it is shown, most respondents in this survey expressed positive agreement with the potential of herbal remedies to enhance dull skin. 87.5% strongly agreed or agreed that vitamin C in lemon juice can protect the skin from UV ray-induced photodamage.

When reviewing the mean, standard deviation, and variance, the respondents indicated a range of opinions. For the belief of vitamin C in lemon juice can protect the skin form UV ray-induced photodamage, the mean score was 2.57, this suggests a low level of agreement among respondents. On the other hand, opinions regarding the role of turmeric reducing inflammation of the skin, contained a mean score of 2.43.

Using papaya face mask can help with shedding of dead skin to promote a brighter complexion received a mean of 4.11. This suggests a moderate level of agreement on its benefits of brightening complexation. Using a turmeric face mask can contribute to healthy skin by reducing reddening and providing a natural glow showed a mean score of 4.11 showing the highest mean score indicating a stronger level of agreement.

Table 4: Opinion-based questions (n=40).

				N	(%)	
#	Question	Agree	Disagree	Mean	STD	Variance
1	I believe the vitamin C in lemon juice can protect the skin from UV ray-induced photodamage.	35 (87.5%)	5 (12.5%)	2.57	3.53	12.47
2	I agree using a turmeric face mask can aid in reducing inflammation of the skin.	38 (95%)	2 (5%)	2.43	3.01	9.04
3	I strongly agree that using a papaya face mask can help	32(80%)	8 (20%)	4.11	5.04	25.36

	with shedding dead skin cells to promote a brighter complexion.					
4	I agree that using a turmeric face mask can contribute to healthy skin by reducing reddening and providing a natural glow.	35 (87.5%)	5 (12.5%)	3.11	4.03	16.22
5	I believe having dull skin is causes by major factors including environmental stressors, lack of proper skin care, and dehydration.	37 (92.5%)	3 (7.5%)	2.37	3.02	9.15
	AVERAGE			**2.918**	**3.726**	**21.576**

A chi-square test of independence was conducted to examine the relationship between gender and correctly answering the question: 'Using papaya on the skin is known for soothing skin irritations.' Results showed a statistically significant association between gender and correct responses, $\chi^2(1N = 40) = 4.43$, $p = 0.035$. Female participants were more likely to answer correctly compared to male participants.

Table 5: Chi-Square Test for Gender vs Knowledge Questions.

Gender	Correct	Incorrect	Total
Male	6	4	10
Female	27	3	30
Total	33	7	40

Chi-square Test: Pearson Value = 4.43, df = 1, p-value = 0.035

DISCUSSION

The primary goal of this study was to evaluate the role of selected herbal remedies specifically turmeric, papaya, and lemon juice in improving dull skin by examining both existing scientific evidence and the understanding of these interventions among future healthcare professionals. While prior research has highlighted the pharmacological and dermatological benefits of these natural agents, this study aimed to bridge the gap between scientific knowledge and its practical interpretation. By focusing on dull skin as a common yet impactful concern, the study sought to explore how these herbal remedies are perceived in terms of effectiveness and relevance within skincare practices.

In addition, a key objective of this study was to assess the knowledge, perceptions, and attitudes of pharmacy students regarding the use of these herbal interventions in skin care. As future healthcare providers, pharmacy students play an essential role in patient education and evidence-based recommendations. Therefore, understanding their level of knowledge and their opinions on herbal remedies is critical. By integrating literature-based evidence with survey findings, this study aims to identify potential knowledge gaps, highlight areas for

educational improvement, and support the safe and rational use of herbal products in dermatologic care.

Accumulation of dead skin cells, environmental pollutants, and lack of radiance are all causes of dull skin. (Answer: True) This statement is supported by the fact that dull skin is to describe skin that lacks radiance, appears lackluster, or lacks a health glow. Several factors contribute to the appearance of dull skin, for instance, dead skin cells, dehydration, poor diet, sun damage, aging, environmental factors, lack of sleep, and stress.

Using papaya on the skin is known for soothing skin irritations. (Answer: True) Due to papaya having rick content of enzymes, vitamins, and other bioactive compounds, benefits of papaya for the skin include exfoliation, rich antioxidants, skin hydration, skin brightening, acne treatment, and anti-aging effects.

Lemon juice is rich in vitamin A. (Answer: False). But less than two-third of students answered it correctly. Lemon juice contains a good source of vitamin C. Vitamin C is a water-soluble vitamin with antioxidant properties. In addition, vitamin C, lemons contain small amounts of other nutrients including vitamin B-complex, minerals including potassium and small amounts of magnesium and copper.

The purpose of turmeric on dull skin is to revive skin by bringing out the natural glow. (Answer: True). Turmeric is considered beneficial for dull skin to several properties, primarily attributed to its active compound, curcumin. Turmeric is known for its skin-brightening properties. It can inhibit the activity of the enzyme tyrosinase, which is involved in the production of melanin. This may help reduce the appearance of dark spots and hyperpigmentation, contributing to a brighter skin tone.

Turmeric can be used as an anti-inflammatory and antioxidant property, and it was answered by more than three-fourth of students. (Answer: True). Turmeric, a bright spice derived from the root of the Curcuma longa plant, has been used for centuries in traditional medicine and culinary practices. One of the health benefits of turmeric is the antioxidant effects. Turmeric is rich in antioxidants that help neutralize free radicals in the body. Antioxidants are essential for protecting cells from damage caused by oxidative stress.

For the Chi-Square test, a statistically significant association was found between gender and knowledge of papaya's role in soothing skin irritations, with female participants more likely

to answer correctly than males. This may reflect greater exposure to skincare information and higher engagement in health-related practices among females. These findings align with existing research suggesting that women often demonstrate higher health awareness. However, the small sample size and use of constructed data should be considered when interpreting the results. Further research with larger samples and detailed data is needed to confirm this association.

The results of the knowledge-based questions indicate that participants demonstrated a moderate to strong understanding of concepts related to dull skin and herbal remedies, with an overall accuracy of 74.36%. The standard deviation (SD = 0.37) and variance (0.144) were relatively low, indicating that responses were closely clustered around the mean and that participants had a consistent level of knowledge. High accuracy was observed for questions related to the causes of dull skin (95%) and the benefits of turmeric and papaya (82.5%), suggesting strong foundational knowledge in these areas. However, a notable gap was identified in the question regarding lemon juice and vitamin A, where only 37.5% answered correctly, highlighting a specific area of misunderstanding. Additionally, the chi-square analysis examining gender differences in knowledge revealed a statistically significant association ($\chi^2 = 4.43$, df = 1, $p = 0.035$). Since the p-value is less than 0.05, this indicates that the relationship between gender and correctly answering the papaya-related question is unlikely due to chance, with female participants more likely to answer correctly than males.

In contrast, the opinion-based questions demonstrated overwhelmingly positive attitudes toward the use of herbal remedies in skincare, with agreement levels ranging from approximately 80% to 95%. Despite this strong agreement, the mean scores (average = 2.918), along with a higher standard deviation (SD = 3.726) and variance (21.576), suggest greater variability in how strongly participants felt about these statements. This indicates that while most participants agreed with the benefits of herbal remedies, the intensity of their agreement differed. For example, turmeric-related statements received some of the highest agreement, reflecting strong confidence in its anti-inflammatory and skin-enhancing properties. The overall interpretation of these findings suggests that although participants hold highly favorable opinions toward herbal skincare, their knowledge is not uniformly strong. The statistically significant p-value further emphasizes that certain demographic factors may influence knowledge levels. Together, these results highlight a gap between perception and evidence-based understanding, underscoring the need for enhanced education

to ensure that positive attitudes are supported by accurate scientific knowledge in future healthcare practice.

This study has several limitations that should be considered when interpreting the findings. First, the sample size was relatively small (N = 40), which limits the generalizability of the results to a broader population of healthcare professionals. Additionally, the study population consisted solely of first-year pharmacy students, which may not accurately reflect the knowledge and opinions of more experienced healthcare providers. The lack of diversity in demographic and educational backgrounds may also introduce bias. Furthermore, the use of self-reported survey data may be subject to response bias, including social desirability bias, where participants may provide answers they believe are expected rather than their true beliefs. The cross-sectional design of the study captures responses at a single point in time and does not account for changes in knowledge or attitudes over time. Lastly, the survey included a limited number of questions, which may not fully capture the depth and complexity of participants' knowledge and perceptions regarding herbal skincare interventions.

Several studies have investigated knowledge, perceptions, and use of herbal and alternative remedies among students and healthcare related populations. For instance, (Bakare et al., 2025) explored students' knowledge and perspectives on herbal treatments for urinary tract infections, reporting moderate awareness alongside misconceptions about safety and effectiveness. Similarly, (Tadele et al., 2025) examined perceptions of herbal remedies for sunburn, highlighting variability in knowledge and concerns regarding improper use. Broader survey-based research has also demonstrated gaps in understanding herbal medicine among students; for example, a study among dental students found that while herbal product use was common, a significant proportion lacked awareness of potential safety issues and herb drug interactions. In addition, research on healthcare trainees, such as pharmacy students, indicates the need for improved education on herbal and natural products to ensure appropriate counseling and safe use.

Within dermatology-related contexts, studies assessing knowledge and perceptions of skin-related products such as skin-lightening agents have similarly revealed inconsistent awareness and potential knowledge gaps even among medical students, despite relatively high usage rates. However, existing literature primarily focuses on isolated conditions (e.g., infections, sunburn) or specific dermatologic practices (e.g., skin-lightening), with limited

attention to common cosmetic concerns such as dull skin and the role of herbal remedies in its management.

Therefore, a clear gap exists in the literature regarding the combined evaluation of the efficacy of herbal remedies for dull skin and pharmacy students' knowledge and perceptions of these treatments. Addressing this gap is essential, as pharmacy students represent future healthcare professionals who play a key role in advising patients on the safe and effective use of both conventional and herbal skincare products. This study aims to fill that gap by providing a focused and systematic assessment of both the perceived efficacy of herbal remedies for dull skin and the level of knowledge, attitudes, and potential misconceptions among pharmacy students.

CONCLUSION

This study demonstrates that there is a body of literature supporting the efficacy of herbal remedies in skin conditions, specifically for dull skin. The survey of pharmacy students indicates that they generally possess a good baseline understanding of these herbal remedies, as reflected by a relatively high average correctness score and low variability in responses. However, important knowledge gaps remain in certain areas. The study also identified a statistically significant difference based on gender, with female participants demonstrating higher accuracy in some knowledge-based questions compared to male participants.

These results highlight the need for a more structured and evidence-based integration of herbal and complementary medicine into the pharmacy curriculum. Emphasizing critical appraisal skills, scientific validation of commonly used remedies, and addressing variability in student background knowledge including gender-related difference that can enhance learning. Strengthening these areas will better prepare students to provide accurate, patient-centered recommendations in clinical practice.

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APPENDIX

Questions

1. What is dull skin caused by?

a. Accumulation of dead skin cells

b. Environmental pollutants

c. Lack of radiance

d. All the above

2. True/False: Using papaya on the skin is known for soothing skin irritations (True) 3. True/False: Lemon juice is rich in vitamin A. (False)
4. What is the purpose of turmeric on dull skin?

a) Reviving skin by bringing out natural glow

b) Protects skin from UV ray induced photodamage.

c) A & B are correct

d) A & B are not correct

5. True/False: Turmeric can be used as an anti-inflammatory and antioxidant property. (True)

Opinion Questions

- I believe the vitamin C for lemon juice can protect the skin from UV ray induced photodamage.
- I agree using a turmeric face mask can aid in reducing inflammation of the skin.
- I strongly agree when using a papaya face mask can help with shedding dead skin cells to promote a brighter complexion.
- I agree that using a turmeric face mask can contribute to healthy skin by reducing reding and providing a natural glow.
- I believe having dull skin is caused by major factors including environmental stressors, lack of proper skin care, and dehydration.