

A study on

Mercury Containing Skin Lightening Products & Perception of health impacts , Colorism & Consumption among Medical students in Islamabad Pakistan

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Disclaimer

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Contents

Executive Summary	ii
Introduction.....	1
Objectives.....	2
Literature Review.....	3
Methodology	4
Findings and Analysis.....	6
Sociodemographic and Socioeconomic Profile of Participants.....	6
Skin Tone Preferences and Perceptions about Skin Lightening	6
Type and Usage of Skin Lightening Products (SLPs)	10
Awareness and Knowledge of Mercury Content in Skincare Products	19
Preferred Strategies for Enhancing Awareness of Mercury-Containing SLPs.....	23
Discussion	24
Recommendations	28
Conclusion	28
References	29

List of Figures

Figure 1: Age Distribution of the Respondents	Error! Bookmark not defined.
Figure 2: Gender Distribution of the Respondents.....	Error! Bookmark not defined.
Figure 2: Gender Distribution of the Respondents	Error! Bookmark not defined.
Figure 3: Satisfaction with Personal Skin Tone.....	Error! Bookmark not defined.
Figure 4: Preferred Skin Tone among Respondents %	7
Figure 5: Factors Influencing Preference for Skin Complexion (%)	7
Figure 6: Most Influential Social Media Platform (in %).....	8
Figure 7: Role of Advertisements in Influencing Use of SLPs.....	9
Figure 8: Type of Advertisements Influencing Use of SLPs	9
Figure 9: Social and Cultural Pressure to Use SLPs.....	10
Figure 10: Have you Ever Used Beauty Product or Cream for Skin Lightening?.....	11
Figure 11: Frequency of SLP Use.....	12
Figure 12: Type of SLPs Purchased (%)	12
Figure 13: Frequency of Use of Different Types of Products (%)	13
Association Between Societal Pressure & SLP Use	14

Figure 14: Percentage Distribution of Students Across Different Years Using Different Brands of SLPs	15
Figure 15: Distribution of SLP Brands Used by Respondents (%)	16
Figure 16: SWCs Purchase Points	19
Figure 17: Awareness of Mercury Exposure Risks from Mercury-Added SLPs	20
Figure 18: Adverse Effects of Using SLPs	21
Figure 19: Sources of Awareness about Risks of Mercury in SLPs	21
Figure 20: Perceived Effective Approaches for Increasing Awareness	23

List of Tables

Table 1: Ever used SLPs Vs Ever felt Pressured to use SLPs due to Societal Pressure.....	14
Table 2: Reasons for Using Skin Lightening Products.....	17

Executive Summary

This survey, conducted among medical students in Islamabad (Pakistan), aimed to assess their awareness and knowledge of Skin Lightening Products (SLPs), particularly those containing mercury. A total of 352 students from both public and private medical colleges participated in the study, representing a range of academic years and both genders. Of the respondents, 26.1% reported having used SLPs at least once in their lifetime, while 12% indicated current use on a daily, weekly, or monthly basis.

The study sought to evaluate patterns of SLP use, identify factors influencing their consumption, and assess the preparedness of future healthcare professionals to educate patients about the potential health risks associated with these products. Data were collected through a cross-sectional, questionnaire-based survey administered digitally. The responses were analysed using descriptive statistical methods, including frequencies, proportions, cross-tabulations, and exploratory data visualisation techniques.

The findings suggest that although the majority of students expressed satisfaction with their natural skin tone, a proportion still demonstrated a preference for lighter skin, reflecting the influence of media representations and prevailing societal beauty standards. At the same time, respondents generally exhibited awareness of the health risks associated with SLPs, particularly those containing hazardous substances such as mercury.

Participants reported a range of adverse effects linked to SLP use, including skin irritation, allergic reactions, and psychological distress. Despite a relatively high level of awareness, the findings highlight persistent misconceptions and ongoing product use among a subset of students. These results underscore the need for enhanced educational initiatives within medical curricula, targeted public awareness campaigns, and stronger regulatory oversight of SLPs. Such measures are essential to promote safe skincare practices, reduce health risks associated with SLP use, and strengthen the capacity of future physicians to provide evidence-based patient education.

Introduction

The pursuit of lighter skin remains a widespread phenomenon across many societies, particularly in regions influenced by historical colonial legacies and entrenched colour-based social hierarchies. Fair skin is frequently associated with beauty, higher social status, attractiveness, and professional success, contributing to the continued demand for Skin Lightening Products (SLPs). These perceptions are often reinforced by media representations, cultural norms, and commercial marketing strategies, despite growing awareness of the potential health risks associated with such products.

This study aims to examine the complex factors influencing the use of SLPs among medical students in Islamabad. Specifically, the research focuses on four key domains:

1. Socio-demographic and socioeconomic characteristics,
2. Skin tone preferences,
3. Patterns of SLP use including product types and frequency of application, and
4. Awareness of mercury-containing SLPs and their associated adverse health effects.

Understanding the socio-demographic and socioeconomic profiles of respondents is essential, as these factors often shape attitudes, perceptions, and behaviours related to skin lightening practices. Variables such as place of residence, educational background, and socioeconomic status may influence individuals' exposure to prevailing beauty standards and their likelihood of using SLPs. Majority of participants were from urban settings and represented diverse socioeconomic backgrounds, suggesting varying levels of exposure to social and cultural influences that promote lighter skin as a desirable aesthetic attribute.

Given that the study population consists of future healthcare professionals, assessing their knowledge, attitudes, and practices regarding SLP use is particularly important. Their understanding of the risks associated with SLPs, especially those containing mercury, will influence their ability to provide informed guidance and patient education in clinical practice.

This study contributes valuable insights into both the prevalence of SLP use and the level of awareness among medical students, highlighting areas where educational interventions and public health initiatives may be required.

The report addresses skin tone preferences, highlighting the cultural pressures that dictate beauty ideals within South Asian societies. Despite a significant portion of respondents expressing satisfaction with their natural skin tone, societal influences and media portrayals continue to drive individuals towards seeking lighter complexions. This

section aims to uncover the psychological and social dynamics that contribute to these preferences.

The report also examines the types of products used for skin lightening. The findings indicate a diverse range of SLPs utilised by respondents, including homemade remedies, over-the-counter products, and prescription creams. Understanding the prevalence of these product types is essential for evaluating potential health risks associated with their usage.

Finally, the study investigates awareness about mercury-added products. Given the documented health risks associated with mercury exposure, it is vital to assess the knowledge levels among medical students regarding the dangers posed by certain skin lightening agents. This awareness can significantly influence their future interactions with patients and their ability to educate others about safe and healthy skincare practices.

By examining these four dimensions, this study provides a comprehensive assessment of the prevalence, determinants, and patterns of skin lightening product use among medical students in Islamabad. Furthermore, it evaluates the extent of participants' knowledge regarding mercury-containing products and their associated health risks, an area of particular importance given the respondents' future roles as healthcare professionals.

The findings contribute to the limited body of evidence on skin lightening practices within educated populations in Pakistan and offer insights into existing knowledge gaps and misconceptions surrounding product safety. Identifying these gaps is essential for informing curricular interventions, strengthening toxicological and public health education, and enhancing the capacity of future physicians to provide evidence-based counselling on the dermatological and systemic consequences of skin lightening product use.

Objectives

The primary objectives of the survey were to assess patterns of SLP use among medical students, explore the factors influencing their use, and evaluate students' preparedness to educate others about the associated health risks. Specifically, it aimed to:

- Assess the awareness and knowledge of medical students regarding Skin Lightening Products (SLPs), with particular emphasis on mercury-added Skin Whitening Creams (SWCs).
- Evaluate trends in the use of and awareness of SLPs across different academic years and between public and private medical institutions.
- Explore the factors influencing the use of SLPs and preferences for lighter skin tones.

- Assess students' knowledge of the adverse health effects associated with mercury-added SLPs and evaluate their preparedness to raise awareness and provide education on these risks in their current and future professional roles.

Literature Review

The literature suggests that skin whitening practices are deeply embedded in cultural constructions of beauty and social status, particularly in South Asia and Africa. In a study examining skin lightening practices and associated health symptoms among female university students in Malaysia, Rusmadi and Praveena (2015) explored the historical and sociocultural factors underlying preferences for lighter skin. They argued that colonial legacies have contributed significantly to the perception of fair skin as a symbol of beauty, power, and higher social standing. During the colonial period, European rulers occupied positions of authority, while indigenous populations were largely subordinated, reinforcing associations between whiteness, privilege, and social prestige. These historical perceptions continue to influence contemporary beauty standards and skin lightening practices in many postcolonial societies.

According to Arora and Amin (2024), the widespread association of lighter skin with higher social status, attractiveness, and success contributes significantly to the growing demand for skin whitening products. This perception is further reinforced by media representations and marketing strategies. Hafeez et al. (2022) found that advertisements promoting fair skin are often directed toward young women, thereby perpetuating societal beauty standards that privilege lighter complexions and increasing pressure to conform to these ideals. Such sociocultural influences are important in understanding the motivations underlying Skin Whitening Product (SWP) use among medical students. Furthermore, awareness of the potential health risks associated with these products remains limited. A study conducted in Nigeria by Wudiri et al. (2024) reported that more than half of the population lacked adequate knowledge regarding the dangers of SWCs. This lack of awareness may contribute to the continued use of potentially harmful products despite their documented adverse effects.

A study conducted in Pakistan through a collaborative initiative of the Ministry of Climate Change and Environmental Coordination and the Sustainable Development Policy Institute assessed mercury levels in both national and international SWCs. Analysis of 59 skin whitening cream samples revealed mercury concentrations ranging from 0.74 ppm to 44,292 ppm, with a mean concentration of approximately 15,000 ppm. Alarming, only three samples contained mercury levels below the permissible limit of 1 ppm established by the Minamata Convention on Mercury (MCM) at the time of the study (Afzal et al., 2018). These findings indicate widespread non-compliance with international safety standards and highlight the substantial risk of mercury exposure among consumers of

skin whitening products in Pakistan. The exceptionally high mercury concentrations reported in many products underscore the need for stronger regulatory oversight, public awareness campaigns, and routine monitoring of cosmetic products to safeguard public health.

According to the World Health Organization (WHO 2019), exposure to mercury through cosmetic products can result in a range of health complications, including skin disorders, kidney damage, and neurological impairment.

Despite the established risks, the continued use of SWPs remains prevalent, often due to inadequate awareness, misleading marketing practices, and limited access to reliable information regarding their potential hazards.

In this context, insufficient knowledge among medical students is particularly concerning, as they are future healthcare professionals expected to counsel patients on safe skincare practices and promote informed health-related decision-making. A lack of awareness within this population may hinder their ability to effectively educate the public and contribute to the prevention of harmful cosmetic practices.

Methodology

A cross-sectional survey was conducted between 10 and 20 October 2024 among medical students enrolled at two medical colleges in Islamabad, representing the public and private sectors. These included Rawal Institute of Health Sciences¹ (Rawal Medical College) and the Federal Medical College (formerly Federal Medical & Dental College, affiliated with SZABMU).²

A structured questionnaire was administered electronically to undergraduate medical students enrolled in the first through fifth years of study. A total of 352 students, aged 20–30 years, participated in the survey. The questionnaire was distributed under supervised conditions through WhatsApp groups and individual outreach, accompanied by an explanation of the study objectives and participation requirements. To ensure adequate representation, participant recruitment followed a predefined female-to-male ratio of 3:1. Ethical approval for the study protocol was obtained from the relevant institutional ethics review committee prior to data collection.

¹ A private medical institution. Rawal Medical College operates under the Rawal Institute of Health Sciences (RIHS), with its teaching hospital, Rawal General & Dental Hospital.

² A public-sector medical college affiliated with the Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU).

The questionnaire was divided into 5 sections:

Section I: Basic Information & Socioeconomic Status of Respondents

Section II: Skin Tone Preferences and Perceptions about Skin Lightening

Section III: Type and Usage of Skin Lightening Products (SLPs)

Section IV: Awareness and Knowledge of Mercury Content in Skincare Products

Section V: Disadvantages of using Mercury-added Cosmetics

Statistical analysis was conducted using Microsoft Excel and Stata version 14.0. Descriptive statistics, including frequencies and proportions, were generated to summarise the data. Cross-tabulations were performed to examine associations between relevant variables.

Findings and Analysis

Sociodemographic and Socioeconomic Profile of Participants

The sociodemographic analysis indicated that 78% of respondents were enrolled in the private medical college, while 22% were from the public sector institution. Females constituted 67% of the sample, compared with 33% males. Most respondents (73%) were aged between 20 and 24 years, and the majority (84%) reported an urban background. In terms of ethnicity, most participants identified as Punjabi, followed by Pashtun and Saraiki. Given the relevance of skin complexion to perceptions and use of SLPs, ethnic composition is noteworthy, as variations in skin tone are observed across ethnic groups in Pakistan. However, substantial diversity exists within each ethnic group, and skin complexion should not be assumed solely on the basis of ethnicity.

With respect to socioeconomic characteristics, 36% of respondents reported annual tuition fees exceeding PKR 1,000,000, while 29% reported annual fees in the range of PKR 200,000-300,000, reflecting enrolment in the public sector medical college. Tuition fee levels were closely associated with both family income and the type of medical institution attended. More than 60% of respondents reported monthly household incomes ranging from PKR 150,000 to 450,000. Variations in socioeconomic status may influence health-related behaviours, consumption patterns, and personal lifestyle choices, including the use of SLPs. Respondents were represented across all years of study, with the largest proportion enrolled in the final year (39%).

Skin Tone Preferences and Perceptions about Skin Lightening

A substantial majority of respondents (88%) reported being satisfied with their skin colour, while only 12% expressed dissatisfaction (Figure 3). Despite these high levels of satisfaction, perceptions of skin complexion appeared to be influenced by external factors. A notable proportion of respondents acknowledged the role of societal expectations, social media content, and advertising in shaping attitudes and preferences regarding skin tone and complexion (Figure 5).

Figure 1: Age Distribution of the Respondents

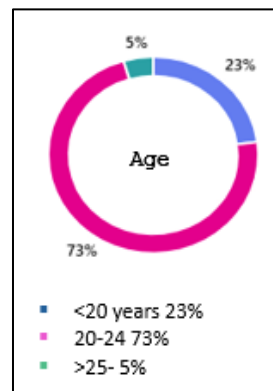


Figure 2: Gender Distribution of the Respondents

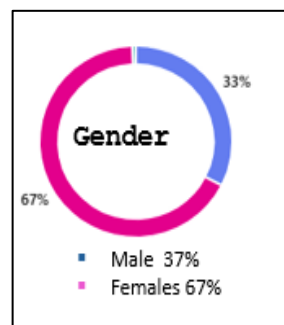
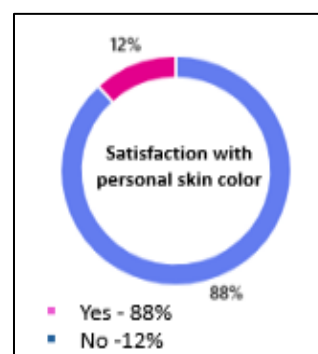


Figure 3: Satisfaction with Personal Skin Tone



Respondents were also asked about their preferred skin tone. Nearly four out of five respondents (79%) preferred their existing skin tone, indicating a high level of self-acceptance. However, approximately one in six respondents (17.4%) expressed a preference for a lighter complexion, suggesting that lighter skin remains a desirable aesthetic trait among a minority of participants. (Figure 4).

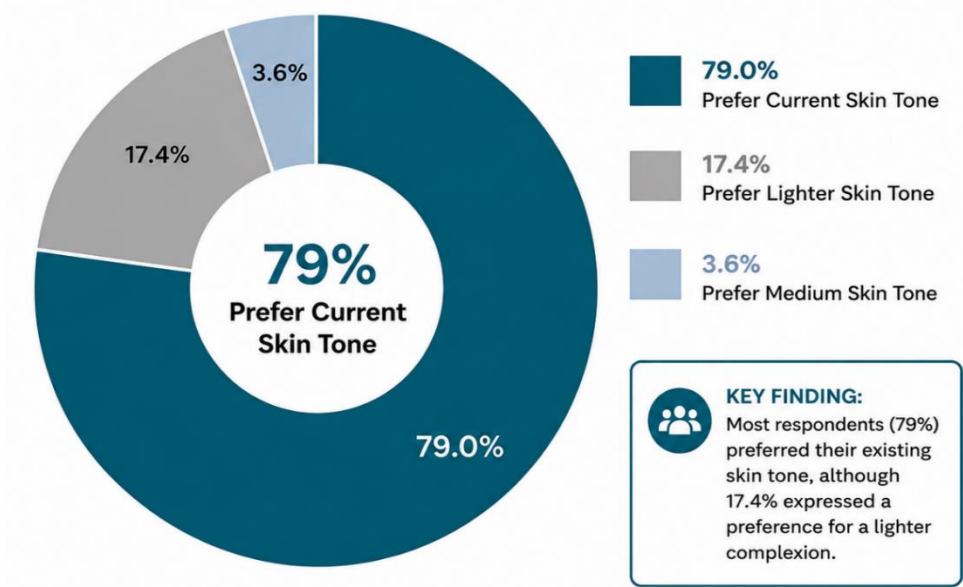


Figure 4: Preferred Skin Tone among Respondents %

The results highlight that social media, family environments, and psychological factors significantly influence the preference for skin complexion (Figure 5).

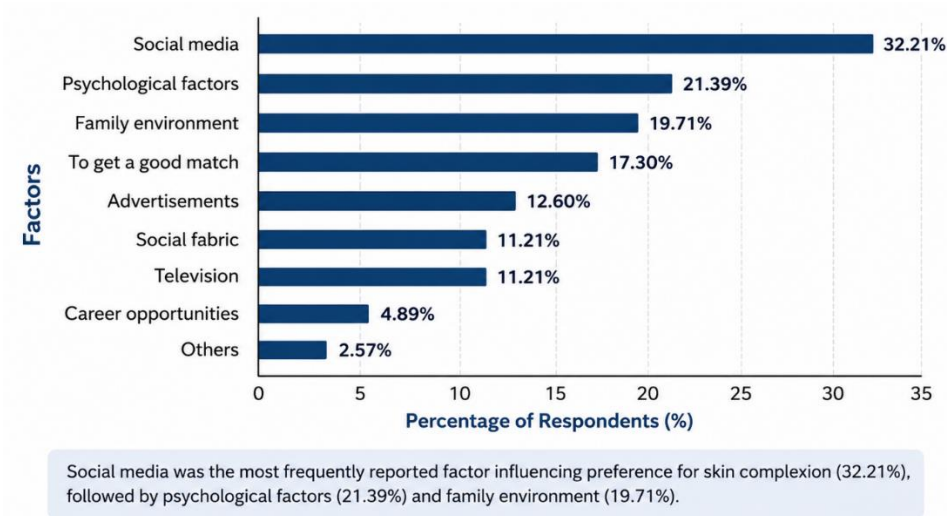


Figure 5: Factors Influencing Preference for Skin Complexion (%)

The findings regarding the influence of social media platforms on skin tone preferences revealed that Instagram was perceived as the most influential platform by 61% of respondents, followed by Facebook, which was identified by 25% of participants. These results suggest that visually oriented social media platforms, particularly Instagram, play a substantial role in shaping perceptions and preferences related to skin tone (Figure 6).

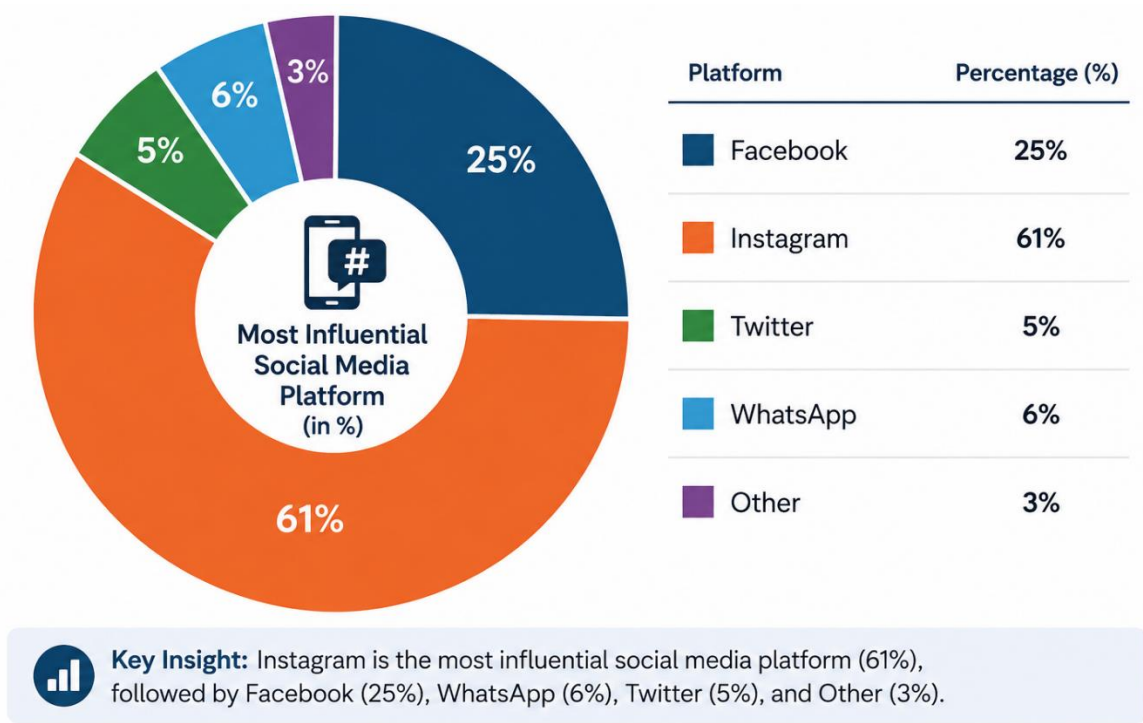


Figure 6: Most Influential Social Media Platform (in %)

Furthermore, statistical analysis indicated a significant association between respondents’ age and the social media platforms influencing their skin tone preferences. Junior students were found to be more susceptible to social media influence than senior students, suggesting that younger individuals may be more vulnerable to appearance-related content and beauty standards disseminated through social networking platforms.

The findings indicated that the majority of respondents reported that advertisements did not influence their skin tone preferences. However, approximately 24% of participants acknowledged the possibility of being influenced by advertisements. Despite this proportion, statistical analysis revealed no significant association between the perceived influence of advertisements and demographic variables, including age, gender, year of study, family income, and tuition fees. These results suggest that the impact of advertisements on skin tone preferences appears to be relatively consistent across different demographic groups within the study population (Figure 7).

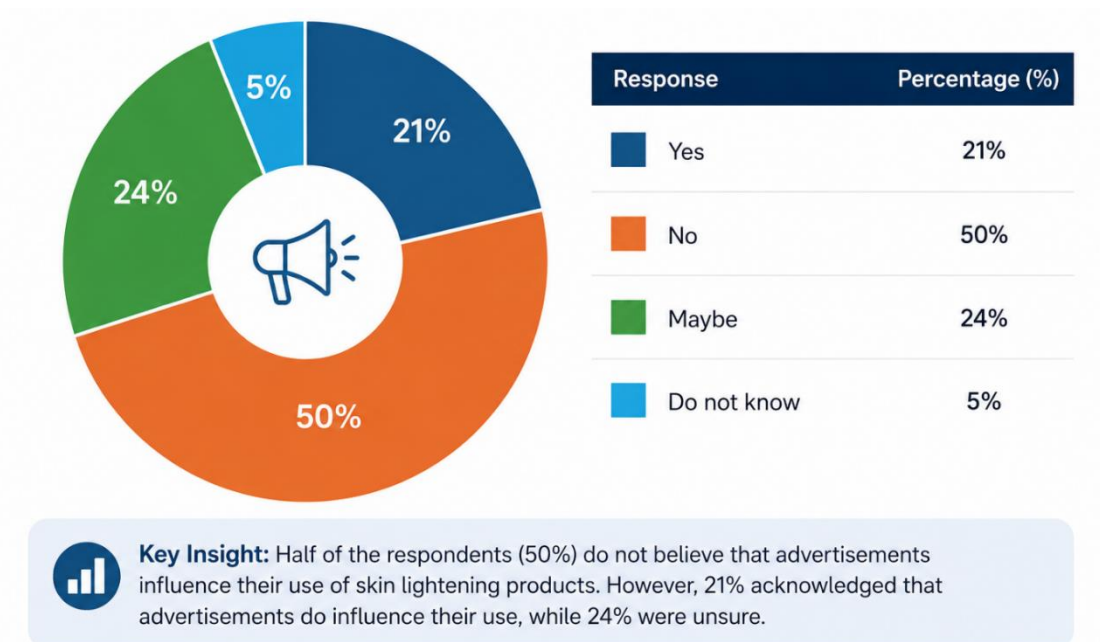


Figure 7: Role of Advertisements in Influencing Use of SLPs

Among the various components of advertisements promoting SLPs, the most influential factors reported by respondents were the visible results presented after product use and the attractive appearance of the models featured in the advertisements. These findings suggest that outcome-oriented marketing strategies and idealised beauty representations play a significant role in shaping consumer perceptions and attitudes towards SLPs (Figure 8).

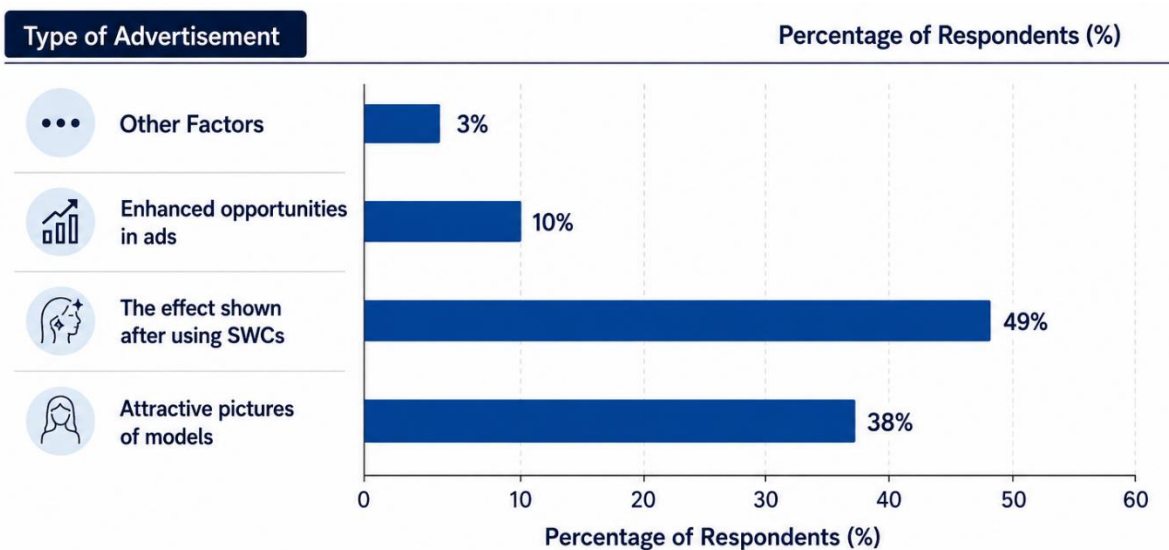


Figure 8: Type of Advertisements Influencing Use of SLPs

Respondents were also asked about the extent of social and cultural pressure related to skin tone and its potential influence on the use of SLPs. The results showed that a substantial majority of respondents (73%) reported experiencing no social or cultural pressure regarding their skin tone. In contrast, 13% indicated that they felt some degree of pressure, while 12% were uncertain about whether such pressures affected them. A small proportion of participants reported that they did not know or could not determine the presence of such influence (Figure 9).

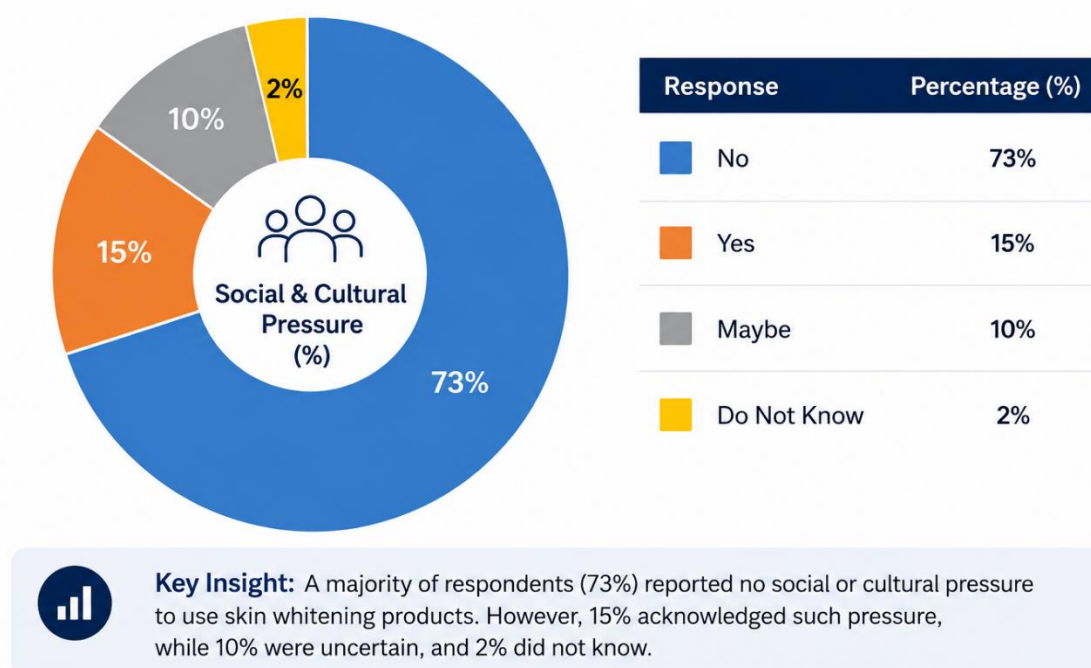


Figure 9: Social and Cultural Pressure to Use SLPs

These findings suggest that, within the study population, social and cultural pressures concerning skin tone may not be a predominant factor driving the use of SLPs. The high proportion of respondents reporting no pressure may reflect a relatively positive perception of natural skin tone or a reduced susceptibility to societal beauty ideals. However, the presence of a notable minority who acknowledged experiencing pressure indicates that social and cultural norms related to skin complexion continue to influence certain individuals and should not be overlooked.

Type and Usage of Skin Lightening Products (SLPs)

The majority of medical students reported that they had never used beauty creams or other products specifically for skin lightening. Of the respondents, 249 (70.7%) indicated that they had not used such products, whereas 92 participants (26.1%) reported having

used SLPs. A small proportion of respondents (3.1%, n = 11) did not provide an answer (Figure 10). Overall, these findings suggest that the use of SLPs is relatively uncommon among the study population.

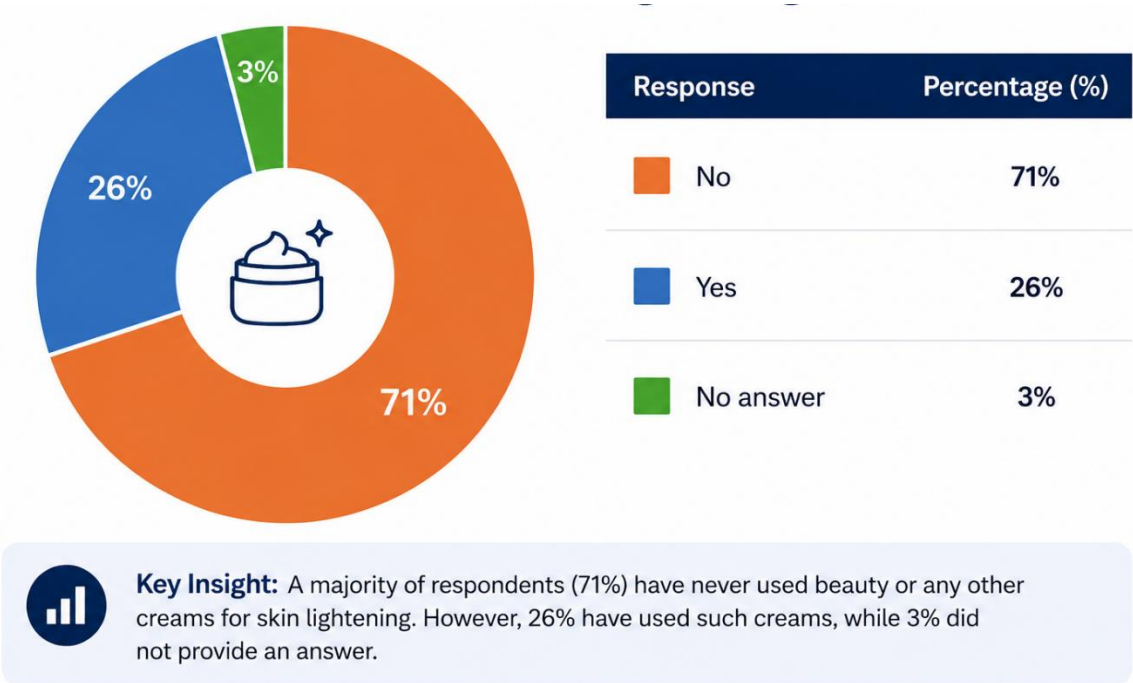


Figure 10: Have you Ever Used Beauty Product or Cream for Skin Lightening?

Further analysis of usage patterns revealed that regular use of SLPs was limited. Only 12% of respondents reported using these products on a daily, weekly, or monthly basis, while 17% reported occasional use. In contrast, the vast majority of participants indicated that they had never used SLPs (Figure 11).

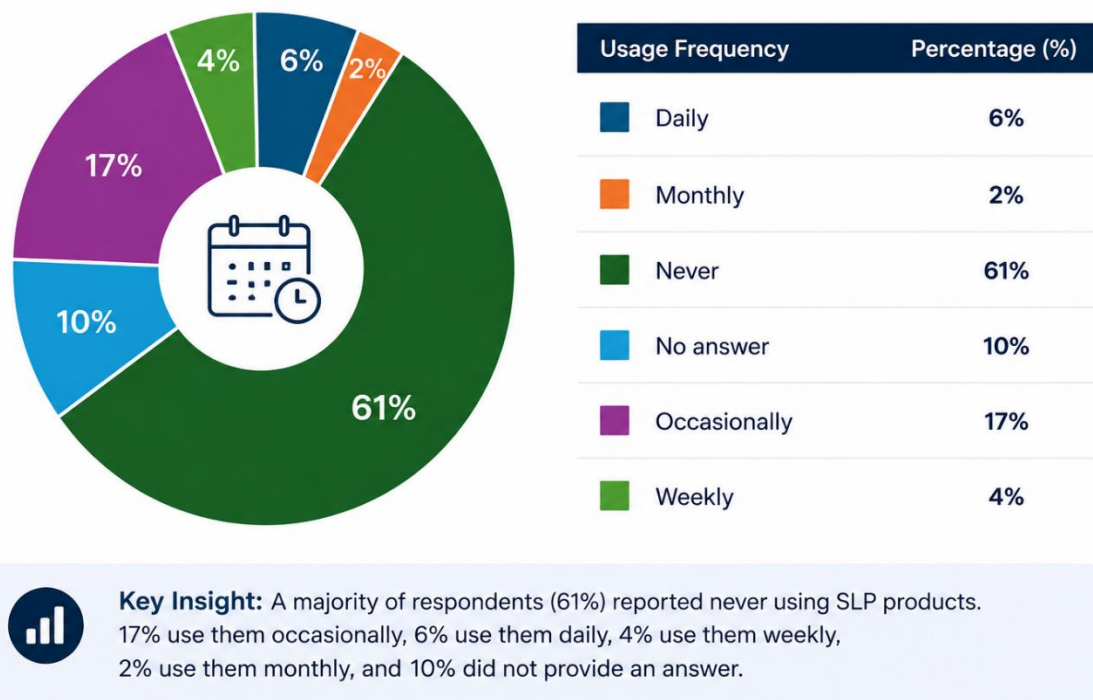


Figure 11: Frequency of SLP Use

These findings demonstrate that although a notable minority of students have experimented with SLPs, sustained or frequent use remains relatively low. This pattern may reflect increasing awareness of the potential health risks associated with SLPs, a preference for natural skin tone, or reduced reliance on skin lightening practices among medical students. The frequency of use showed that females use these products daily, more often as compared to males.

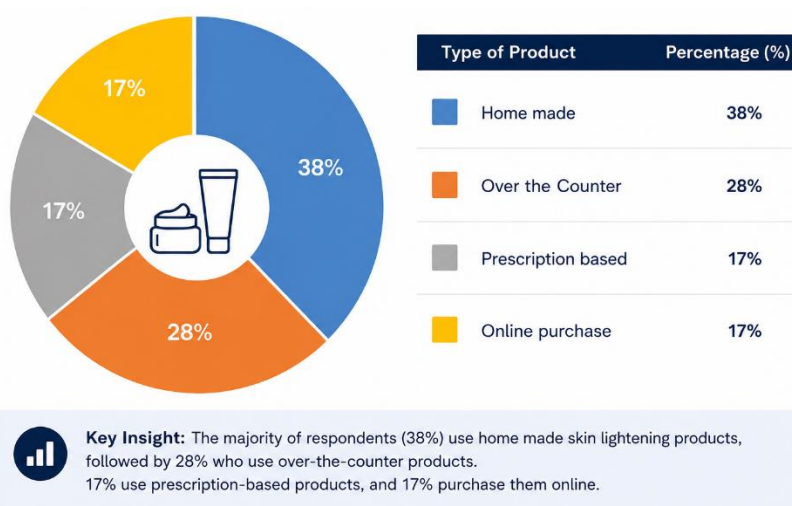


Figure 12: Type of SLPs Purchased (%)

Among respondents who reported using SLPs, prescription-based products were the most frequently used, accounting for 33.3% of users. Homemade preparations were the second most common source (26.0%), followed by over-the-counter products (15.6%) and products purchased online (12.5%). These findings suggest that respondents were more likely to rely on medically prescribed or self-prepared products than on commercially marketed alternatives.

With regard to online-purchased SLPs, the majority of respondents reported occasional use (44%). Weekly use was reported by 25% of users, followed by monthly use (18%), while daily use was the least common pattern (13%). This distribution indicates that products obtained through online sources are generally used intermittently rather than on a regular basis, suggesting limited routine dependence on online-purchased SLPs.

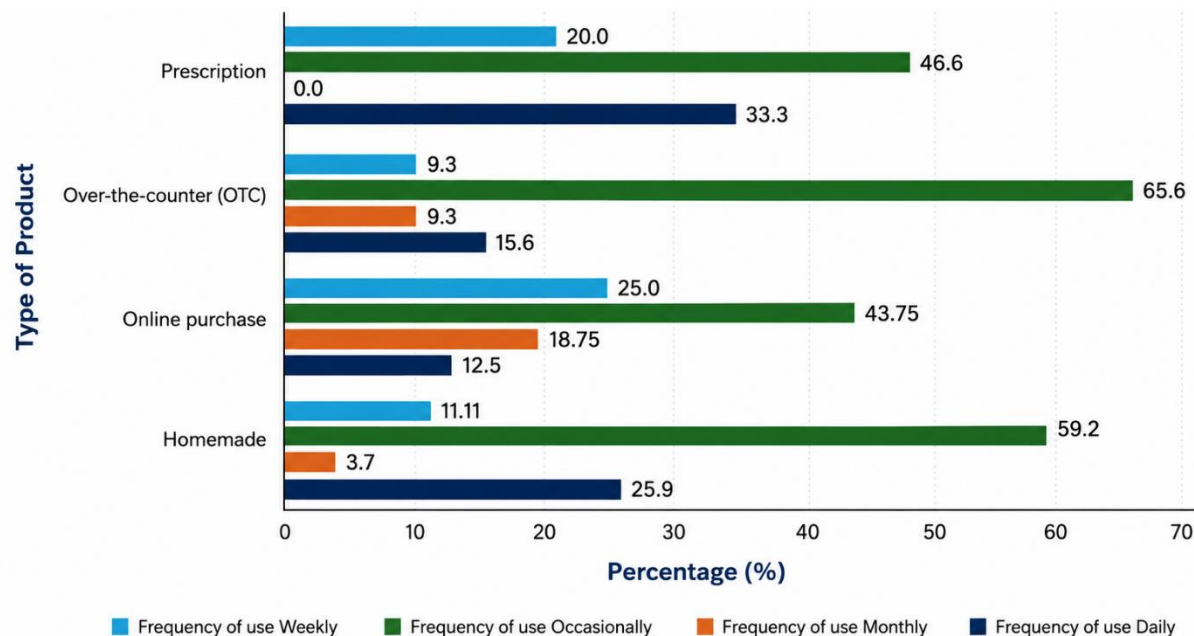


Figure 13: Frequency of Use of Different Types of Products (%)

Table 1 presents the association between perceived societal pressure to lighten skin tone and the use of SLPs. The findings suggest a positive relationship between experiencing social pressure and SLP use. Among the 251 respondents who reported not feeling pressured to lighten their skin tone, the majority (n = 204; 81.3%) had never used SLPs, while only 42 respondents (16.7%) reported using them. Five participants did not provide a response.

Table 1: Ever used SLPs Vs Ever felt Pressured to use SLPs due to Societal Pressure

<i>Association Between Societal Pressure & SLP Use</i>		Have you ever used SLPs?			
		Yes	No	No Answer	Total
Have you ever felt pressured by societal expectations or cultural norms to use skin lightening creams?	Yes	28	18	0	46
	No	42	204	5	251
	Maybe	19	20	1	40
	Don't Know	3	6	0	9
	No Answer	0	1	5	6
	Total	92	249	11	352

In contrast, among respondents who reported feeling social pressure to use SLPs, a greater proportion reported using these products (n = 28; 60.9%) than not using them (n = 18; 39.1%). These findings indicate that perceived societal pressure may be associated with an increased likelihood of SLP use. Although the association appears modest, the substantially higher prevalence of SLP use among those experiencing pressure suggests that social expectations and beauty norms related to skin tone may influence individuals' decisions to engage in skin lightening practices

Figure 14 illustrates the distribution of SLP brand use across different years of medical education. Overall, final-year students accounted for the highest proportion of users of most brands, including Faiza Beauty Cream (40.0%), Golden Pearl Beauty Cream (52.63%), and international brands (35.09%). In contrast, the use of other local brands was most prevalent among first-year students (31.18%), closely followed by final-year students (29.63%). These findings suggest that brand preferences vary across academic years, with final-year students demonstrating greater use of established commercial and international brands, whereas first-year students showed a relatively higher preference for local brands.

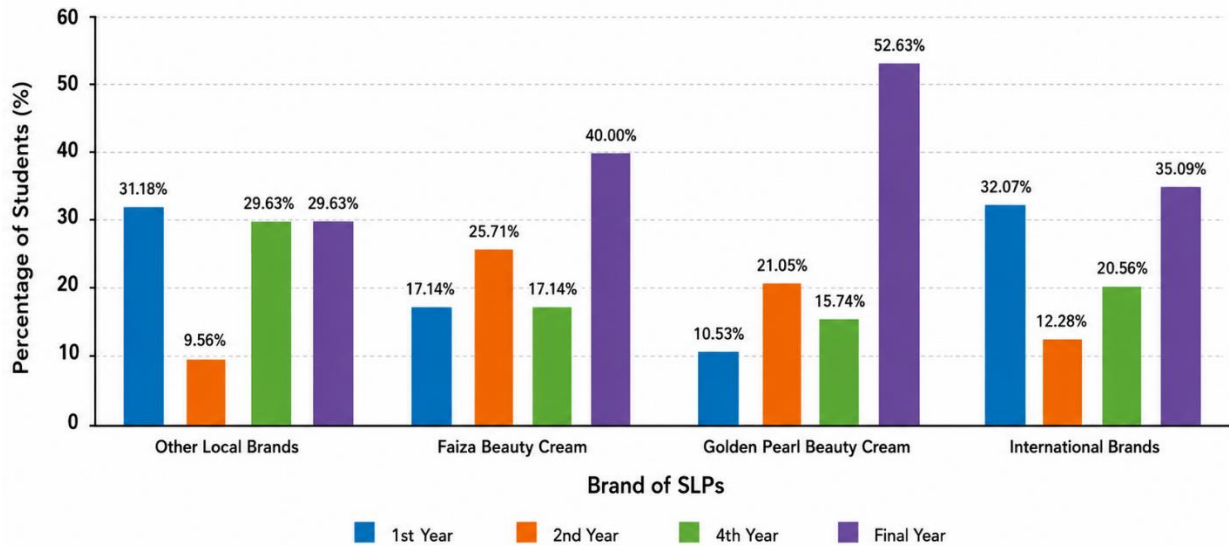


Figure 14: Percentage Distribution of Students Across Different Years Using Different Brands of SLPs

Participants were asked to identify the SLP brands they had used and were allowed to select more than one brand. The majority of respondents (75%) reported using only one brand, while 10% indicated having used three brands. Smaller proportions reported using two brands (7%) or more than three brands (7%). These findings suggest that most users tend to remain loyal to a single product rather than experimenting with multiple brands, indicating relatively stable brand preferences among SLP users.

Figure 15 illustrates the distribution of SLP brands used by respondents. International brands constituted the largest single category of products used (27.35%), indicating a substantial preference for internationally marketed SLPs. Among individual local brands, Golden Pearl Beauty Cream was the most commonly used (20.0%), followed by Faiza Beauty Cream (18.0%) and Face Fresh (9.0%).

Although international brands represented the largest individual category, the combined use of local brands exceeded that of international brands, suggesting that locally available products remain an important component of skin lightening practices. In addition, the prominence of a small number of established local brands dominate the local SLP market (Figure 15).

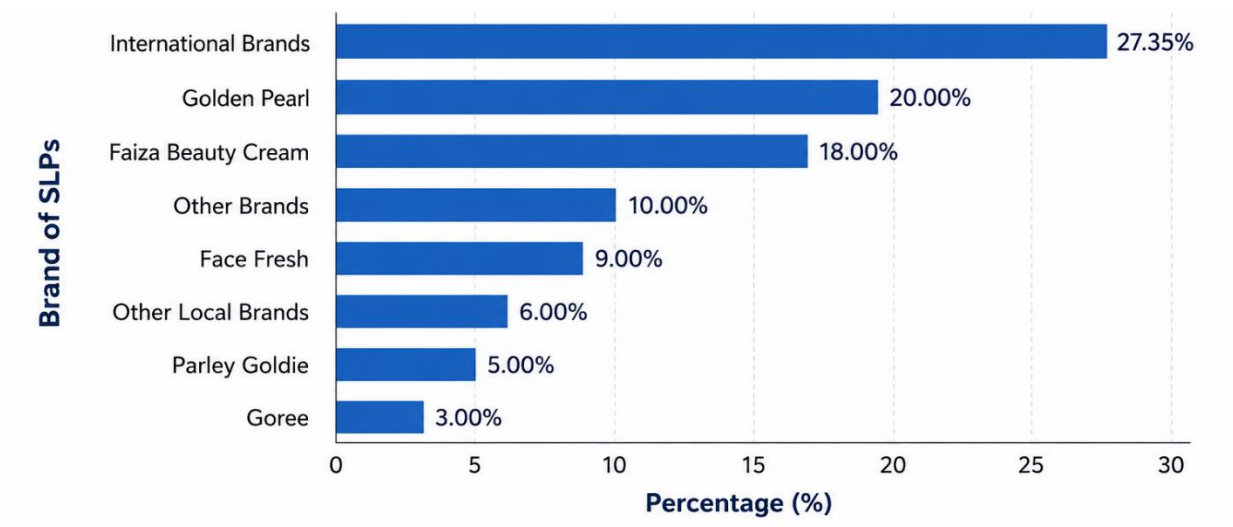


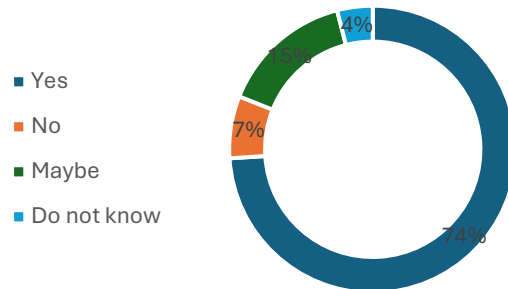
Figure 15: Distribution of SLP Brands Used by Respondents (%)

To explore the motivations underlying the use of SLPs, respondents were asked to indicate their level of agreement with a series of statements related to potential reasons for SLP use. Four questions were included in this section, and participants were provided with four response options: *Yes*, *No*, *Maybe*, and *Do not know*. The responses were analysed to identify the most commonly perceived factors influencing the use of SLPs among medical students (see Table 2).

Table 1: Reasons for Using Skin Lightening Products

A substantial majority of respondents (74%) agreed that people use SLPs to appear more attractive and fashionable. An additional 15% selected 'Maybe,' indicating some uncertainty but suggesting that they considered this a possible motivation. In contrast, only 7% disagreed with the statement, while 4% reported that they did not know. These findings indicate that perceived improvements in physical attractiveness and conformity to contemporary beauty trends are widely regarded as key motivations for the use of SLPs. The high level of agreement suggests that cosmetic and social appearance-related factors play a significant role in shaping attitudes towards skin lightening practices among the study population.

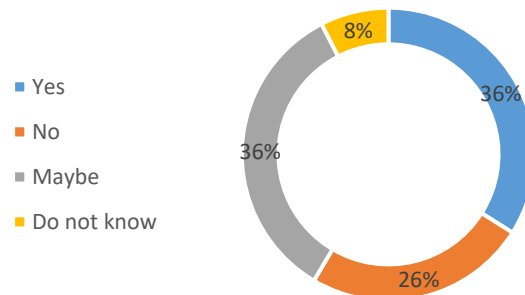
To look pretty and trendy due to fair complexion

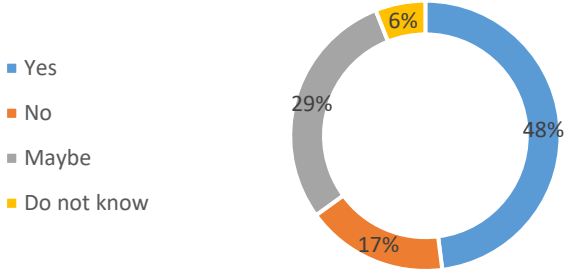
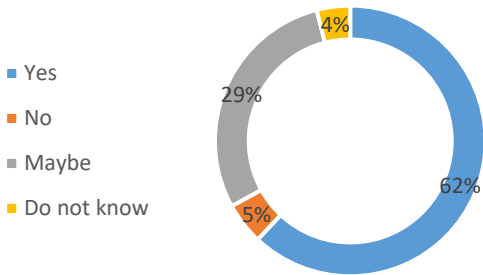


When asked whether the use of SLPs is motivated by the desire for a successful career, respondents expressed mixed views. Approximately 36% agreed that career advancement may be a reason for using SLPs, while an equal proportion (36%) were uncertain and selected 'Maybe.' In contrast, 26% disagreed with this statement.

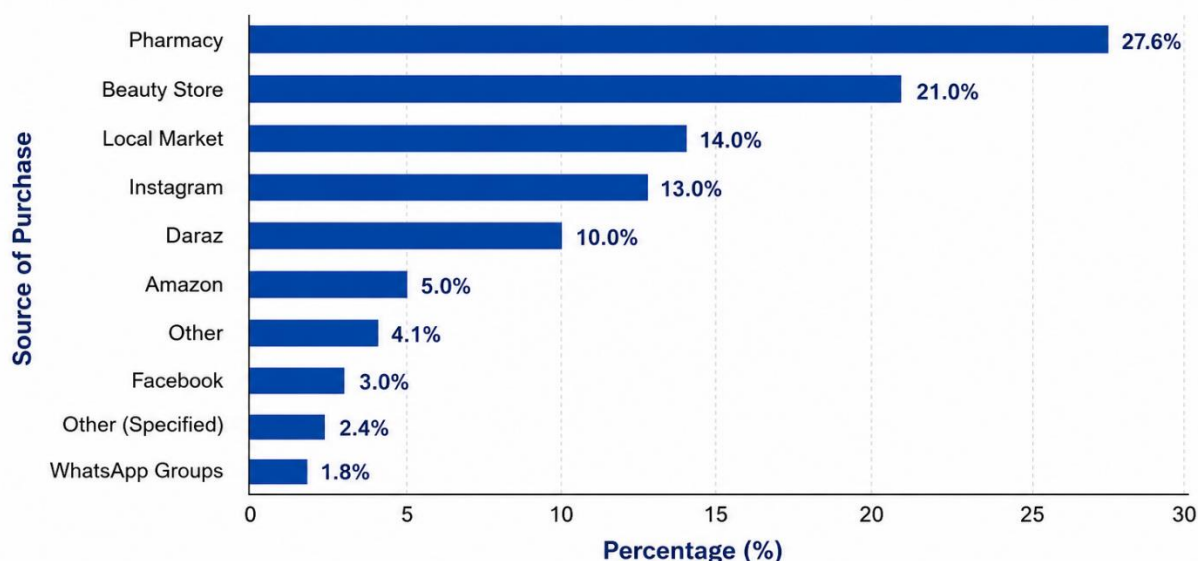
These findings suggest that the perceived relationship between skin tone and career success is less widely accepted than appearance-related motivations for SLP use. Nevertheless, the fact that more than one-third of participants endorsed this reason suggests that beliefs linking lighter skin tone with social and occupational advantages may still persist among a segment of the study population.

To be more successful in career



Nearly half of the respondents (48%) agreed that the use of SLPs is associated with belonging to a higher social class. A further 29% were uncertain and selected 'Maybe,' while 17% disagreed with this perception. The remaining 6% reported that they did not know. These findings suggest that a considerable proportion of respondents perceive skin lightening practices as being linked to social status and prestige. The relatively high level of agreement indicates that lighter skin tone may still be viewed by some individuals as a marker of social advantage or upward social mobility.	Association with High Social Class  ■ Yes ■ No ■ Maybe ■ Do not know <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Yes</td> <td>48%</td> </tr> <tr> <td>No</td> <td>17%</td> </tr> <tr> <td>Maybe</td> <td>29%</td> </tr> <tr> <td>Do not know</td> <td>6%</td> </tr> </tbody> </table>	Response	Percentage	Yes	48%	No	17%	Maybe	29%	Do not know	6%
Response	Percentage										
Yes	48%										
No	17%										
Maybe	29%										
Do not know	6%										
A majority of respondents (62%) agreed that impressing a spouse or potential spouse is an important reason for the use of SLPs. The high level of agreement indicates that appearance and perceived attractiveness within marital or romantic contexts may play an important role in motivating skin lightening practices. This reflects the influence of social and cultural beauty norms, where lighter skin tone may be associated with increased attractiveness and desirability in partner selection and marital relationships.	To impress spouse  ■ Yes ■ No ■ Maybe ■ Do not know <table border="1"> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Yes</td> <td>62%</td> </tr> <tr> <td>No</td> <td>5%</td> </tr> <tr> <td>Maybe</td> <td>29%</td> </tr> <tr> <td>Do not know</td> <td>4%</td> </tr> </tbody> </table>	Response	Percentage	Yes	62%	No	5%	Maybe	29%	Do not know	4%
Response	Percentage										
Yes	62%										
No	5%										
Maybe	29%										
Do not know	4%										

Respondents were also asked about their preferred sources for purchasing SLPs and were allowed to select multiple options. The findings revealed that pharmacies, beauty shops, and local markets were the most commonly preferred points of purchase, indicating a preference for readily accessible retail outlets. Online shopping was also a notable purchasing channel, being selected by approximately 30% of respondents (Figure 16).



Key Finding: Pharmacies were the most frequently reported point of purchase for skin-lightening products (27.6%), followed by beauty stores (21%) and local markets (14%). Online and social media channels, particularly Instagram (13%) and Daraz (10%), also represented notable sources of product acquisition.

Figure 16: SWCs Purchase Points

Among social media platforms used for purchasing or accessing information about SLPs, Instagram emerged as the most frequently reported platform, accounting for 13% of responses. These findings suggest that while traditional retail outlets remain the primary sources for obtaining SLPs, digital platforms and online marketplaces are becoming increasingly important. The prominence of Instagram further highlights the growing role of social media in influencing consumer behaviour and facilitating access to beauty and cosmetic products.

Awareness and Knowledge of Mercury Content in Skincare Products

A substantial majority (74%) recognised the health risks associated with mercury exposure, especially concerning unborn children and young children. 61% knew that the unborn, babies, young children and other household members could be exposed to

dangerous levels of mercury with the use of mercury-added SLPs. However, 39% of medical students were unaware of this effect (Figure 17).

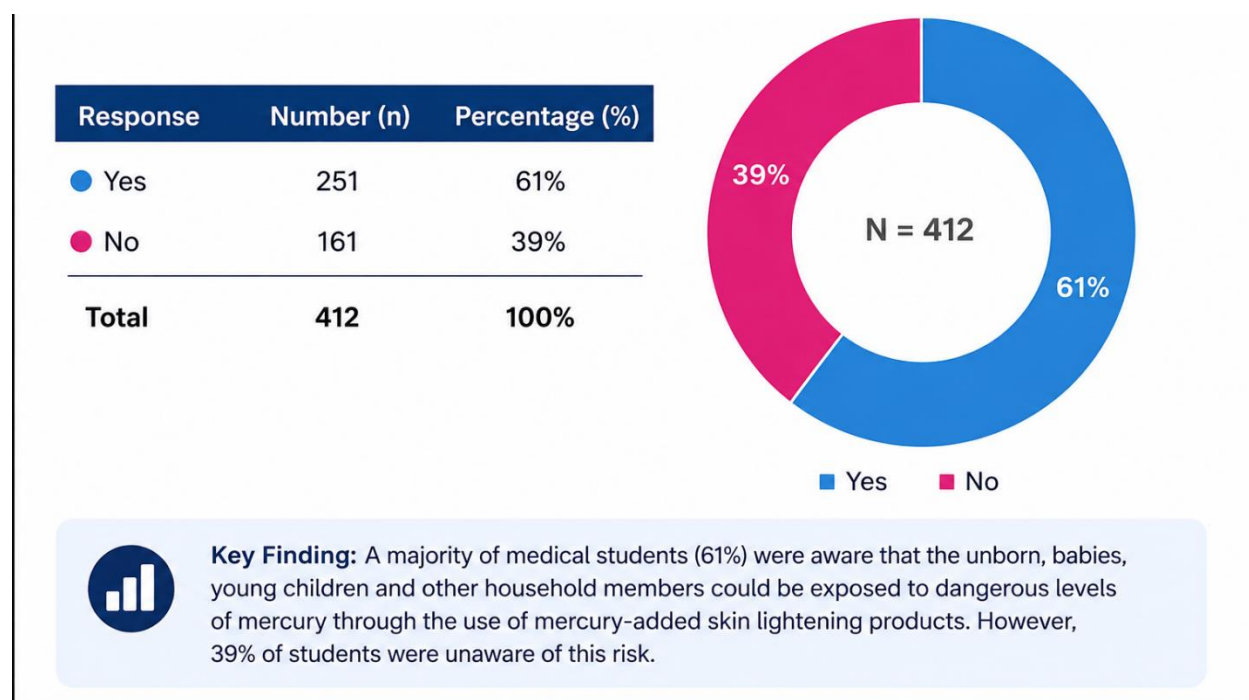


Figure 17: Awareness of Mercury Exposure Risks from Mercury-Added SLPs

Regarding awareness of the adverse effects associated with mercury-containing SLPs, redness was the most commonly recognised effect, identified by 30% of respondents. This was followed by skin rashes, reported by 25% of participants, and dark patches, which were recognised by 20% of respondents (Figure 18). These findings suggest that respondents were most aware of the visible dermatological consequences of mercury-containing SLPs. However, the relatively modest proportions indicate that awareness of the harmful effects of mercury exposure may be limited among a substantial segment of the study population. This highlights the need for increased educational efforts to improve knowledge of both the short-term and long-term health risks associated with the use of mercury-containing SLPs.

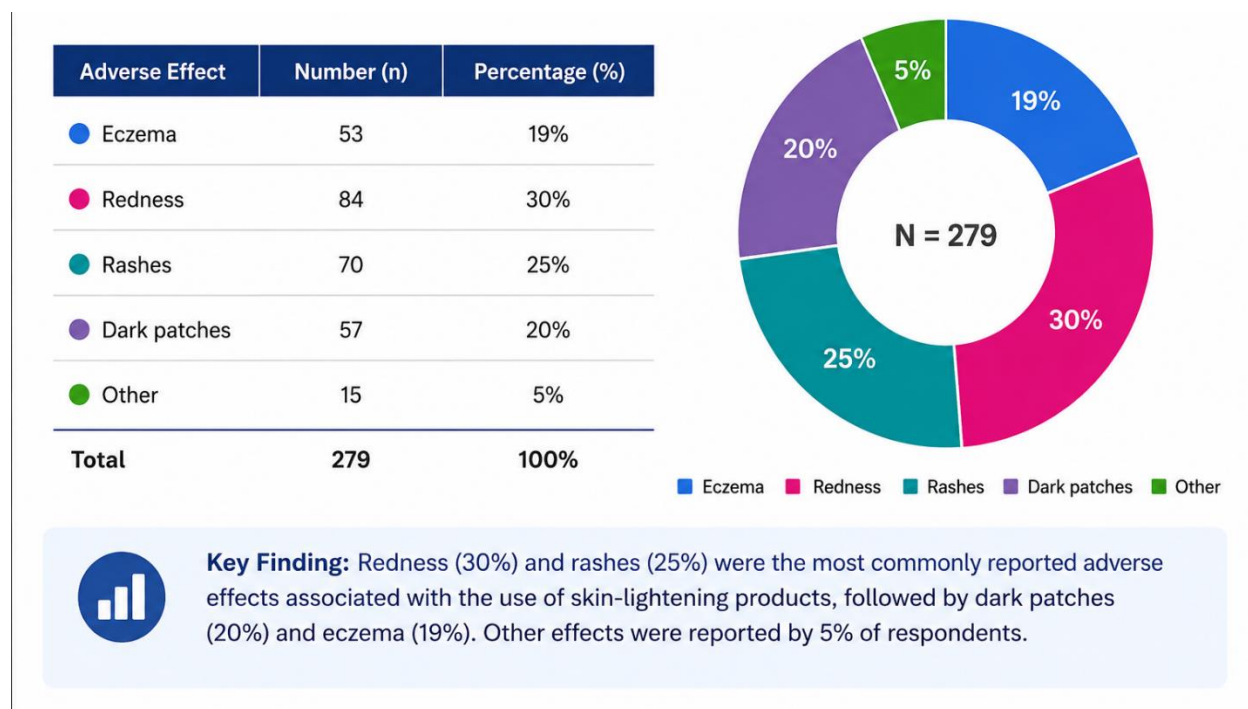


Figure 18: Adverse Effects of Using SLPs

A core objective of this study was to assess respondents' awareness of mercury content in SLPs and to identify the primary sources of this awareness. The findings revealed that media was the leading source of information, with 52.43% of respondents reporting that they learned about mercury in SLPs through media-related channels. In comparison, 21.4% indicated that their awareness originated from the medical school curriculum (Figure 19).

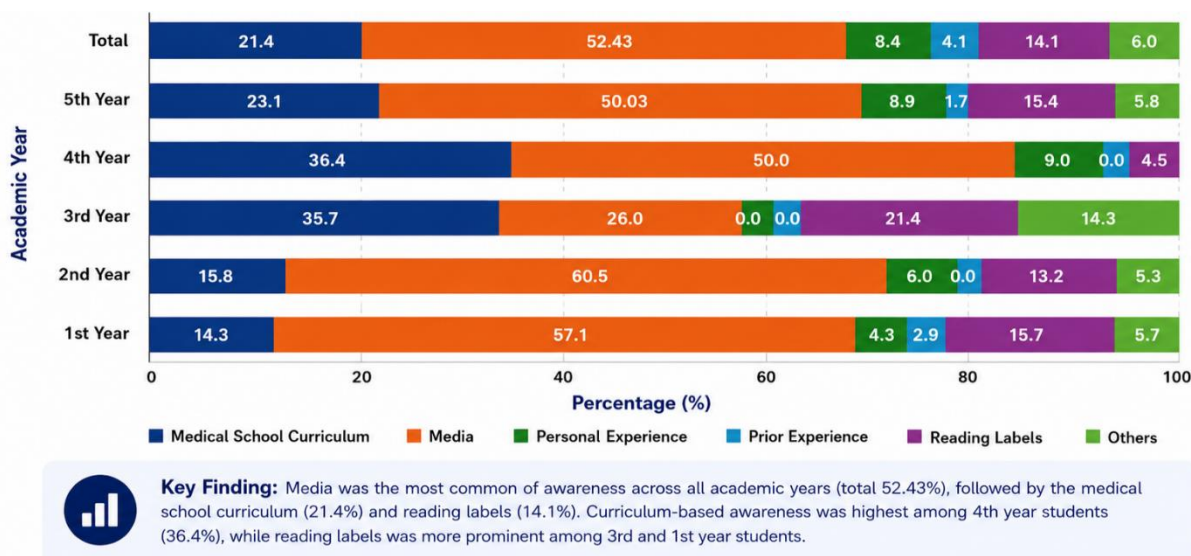


Figure 19: Sources of Awareness about Risks of Mercury in SLPs

Furthermore, awareness appeared to increase with academic progression, suggesting that students in higher years of study were more knowledgeable about the presence and risks of mercury in SLPs. This trend was particularly evident for awareness gained through media exposure and formal medical education. These findings highlight the important role of both mass media and medical training in improving knowledge about the potential health hazards associated with mercury-containing SLPs.

Figure 19 also shows that media was the predominant source of awareness regarding the risks of mercury in SLPs across all academic years, with the highest proportion reported among second-year students (60.5%), followed by first-year students (57.1%). The medical school curriculum was the second most important source of awareness and was particularly prominent among third-year (35.7%) and fourth-year students (36.4%), suggesting an increasing contribution of formal medical education as students progress through their training. In contrast, personal experience and prior experience contributed relatively little to awareness across all years. Reading product labels was another important source of information, particularly among third-year students (21.4%), and to a lesser extent among first-year (15.7%) and fifth-year students (15.4%). The 'Other' category, which included sources such as friends, professional courses, and word-of-mouth communication, accounted for a comparatively small proportion of awareness across most academic years.

The findings also indicate that majority of medical students (61%) felt adequately prepared to educate patients about the risks associated with mercury-containing SLPs. However, more than one-third of respondents either did not feel prepared (26%) or were uncertain about their ability to provide such education (13%). This suggests that although most students possess a degree of confidence in their knowledge, substantial gaps in preparedness remain.

Furthermore, an overwhelming majority of respondents (83%; 281 out of 340 students) believed that medical students should receive additional education regarding the dangers of mercury-added SLPs. This strong consensus reflects a perceived need for greater emphasis on the health risks associated with these products within medical training.

Taken together, these findings highlight the importance of strengthening educational initiatives related to mercury-containing cosmetic products in medical curricula. Enhanced training could improve students' knowledge, confidence, and capacity to counsel patients effectively, thereby preparing future healthcare professionals to play a more active role in public health education and the prevention of mercury-related health risks.

Preferred Strategies for Enhancing Awareness of Mercury-Containing SLPs

Respondents identified a variety of preferred approaches for enhancing awareness and education beyond the formal medical curriculum.

Seminars and workshops emerged as the most frequently recommended educational strategies, reflecting a strong preference for interactive, structured, and discussion-based learning environments. Approximately 27% of respondents considered seminars and workshops to be the most effective means of increasing awareness. Social media was the second most frequently selected option (19%), underscoring its growing role as an accessible and influential platform for health education and information dissemination.

Awareness campaigns were also commonly endorsed, suggesting that respondents value broad public engagement and community-based educational initiatives. In addition, lectures and digital learning resources, including webinars and online articles, were identified as useful methods for improving knowledge. These findings indicate that students favor a combination of traditional educational approaches and modern digital platforms, highlighting the importance of adopting a multifaceted strategy for awareness-building and capacity development.



Figure 20: Perceived Effective Approaches for Increasing Awareness

Discussion

Medical students, as future healthcare professionals, have an important role in educating patients and the wider community about the risks associated with SLPs, particularly those containing mercury. Despite their medical background, the findings of this study indicate that gaps in knowledge, attitudes, and practices regarding SLP use continue to exist. The study provides valuable insights into medical students' perceptions of skin tone, their use of SLPs, and their awareness of the health risks associated with these products.

A notable finding was that the majority of respondents expressed satisfaction with their natural skin tone and reported experiencing little or no social or cultural pressure regarding skin complexion. This suggests a generally positive attitude towards natural skin tone among medical students and may reflect changing perceptions of beauty within this educated population. Nevertheless, a considerable proportion of respondents acknowledged that social expectations, media influences, and beauty standards continue to shape attitudes toward skin tone. Many participants believed that SLPs are used to enhance attractiveness, appear fashionable, impress a spouse or potential partner, and signify higher social status. These findings are consistent with previous studies demonstrating that lighter skin is often associated with beauty, desirability, and social prestige in many societies.

Although most respondents reported never using SLPs and regular use was relatively uncommon, a substantial minority indicated previous or current use of these products. Furthermore, respondents who perceived societal pressure to lighten their skin were more likely to report SLP use than those who did not experience such pressure. This finding highlights the continued influence of social and cultural norms on cosmetic practices and suggests that perceived pressure remains an important determinant of SLP use among some individuals.

One of the most important findings of the study is the apparent gap between awareness and behaviour. While many respondents demonstrated awareness of the potential health risks associated with mercury-containing SLPs, some continued to use these products. This suggests that knowledge alone may not be sufficient to change behaviour when strong appearance-related, social, or cultural motivations are present. Similar knowledge-behaviour gaps have been observed in studies examining other health-related behaviours, where awareness of risks does not necessarily translate into safer practices. Therefore, interventions aimed at reducing SLP use should address not only knowledge deficits but also the underlying social and psychological factors that motivate product use.

The influence of media emerged as a particularly important factor in shaping perceptions of skin tone and SLP use. Instagram was identified as the most influential social media

platform affecting skin-tone preferences, while advertisements featuring attractive models and visible product results were perceived as especially persuasive. The predominance of visual media in influencing attitudes towards skin tone underscores the role of digital platforms in reinforcing beauty ideals and consumer behavior. Importantly, junior students were found to be more susceptible to social media influences than senior students, suggesting that age, educational maturity, and increased health awareness may reduce vulnerability to appearance-related messaging over time.

The study also revealed differences across academic years in relation to awareness of mercury-containing SLPs. Awareness generally increased with academic progression, particularly through exposure to the medical school curriculum and media sources. Senior students demonstrated greater awareness of the risks associated with mercury-containing products than their junior counterparts, indicating that medical education contributes positively to knowledge acquisition. However, media remained the primary source of awareness across all academic years, emphasising the powerful role of public communication channels in disseminating health information.

With respect to product use patterns, prescription-based SLPs were reported as the most common source of products, followed by homemade preparations and over-the-counter purchases. This finding suggests that skin lightening practices are not solely confined to informal markets but may also involve medically prescribed products. Most users also reported using only one brand, indicating relatively stable product preferences and a degree of brand loyalty. Such patterns may increase prolonged exposure to potentially harmful ingredients when unsafe products are used consistently.

Respondents demonstrated reasonable awareness of the dermatological consequences associated with mercury-containing SLPs, particularly redness, skin rashes, and dark patches. However, awareness appeared to focus primarily on visible skin effects rather than the broader systemic health consequences of mercury exposure. Given the serious neurological, renal, and reproductive effects associated with chronic mercury exposure, there remains a need for more comprehensive education regarding the full spectrum of risks posed by mercury-containing cosmetic products.

An encouraging finding was the strong support for enhanced educational interventions. Although 61% of respondents felt adequately prepared to educate patients about the dangers of mercury-containing SLPs, more than one-third either did not feel prepared or were uncertain about their ability to provide such counseling. Furthermore, 83% of respondents believed that medical students should receive additional education on this topic. This apparent discrepancy suggests that current training may provide a foundation of knowledge but may not sufficiently develop confidence and competency in patient education. Respondents identified seminars, workshops, awareness campaigns, social

media initiatives, lectures, and online learning resources as effective approaches for improving awareness and capacity building. These findings support the adoption of a multifaceted educational strategy that combines formal curriculum content with interactive and digital learning opportunities.

Overall, the findings indicate that while awareness of the risks associated with mercury-containing SLPs is relatively high among medical students, social influences, media exposure, and beauty-related motivations continue to shape attitudes and behaviours. The persistence of SLP use despite awareness of potential harms highlights the complexity of the issue and demonstrates that educational interventions alone may not be sufficient. Strengthening medical curricula, promoting evidence-based public awareness campaigns, regulating the marketing and sale of hazardous SLPs, and addressing societal beauty norms may collectively contribute to reducing the use of harmful SLPs and improving public health outcomes.

SIGNIFICANT FINDINGS



01

Satisfaction with Natural Skin Tone

Many medical student respondents expressed satisfaction with their natural skin tone.



02

Influence of Societal Pressure

Despite satisfaction, some students still desired lighter skin due to societal pressures and media influence.



03

Use of SLPs

Some of respondents indicated having used at least once a skin lightening product.



04

Awareness of Mercury Risks

Most respondents were aware of the health risks associated with mercury in SLPs, while a considerable number of students still used SLPs despite being aware of the risks and experienced adverse effects like skin irritation, rashes etc.



05

Psychological Factors

Low self-esteem and body image issues may contribute to SLP use.



06

Role of Social Media

Social media and advertisements played a significant role in shaping beauty ideals and influencing SLP use as well as in spreading awareness about the adverse effects of using SLPs containing harmful chemicals.



These findings highlight the complex interplay of personal satisfaction, societal influence, awareness, and psychological factors in shaping the use of skin lightening products among medical students.

Recommendations

- **Enhanced Education and Awareness:** Implement comprehensive education campaigns to address misconceptions about skin lightening and promote healthy and safe skincare practices. Targeted interventions should address the specific concerns and cultural context of medical students as future healthcare providers.
- **Regulation of SLP Products:** Strengthening of regulations regarding the sale and distribution of SLPs is required, particularly those containing harmful substances like mercury. This includes stricter monitoring and enforcement to protect consumers.
- **Addressing Societal Pressures:** Public health initiatives should aim to challenge unrealistic beauty standards perpetuated by media and societal norms. Promoting acceptance of diverse skin tones is crucial.
- **Psychological Support:** Offer resources and support for individuals struggling with low self-esteem and body image issues. Mental health services can play a role in addressing the psychological factors driving SLP use.
- **Future Directions:** Future nationwide studies using robust and representative sampling are recommended to generate generalisable evidence that can inform curriculum development and strengthen medical education on the risks of mercury-containing SLPs.

Conclusion

In conclusion, this study provides important insights into the use of Skin Lightening Products (SLPs), perceptions of skin tone, and awareness of mercury-related health risks among medical students in Islamabad, Pakistan. While awareness of the harmful effects of mercury-containing SLPs was generally high, social, cultural, and media influences continued to shape attitudes and behaviors. The findings highlight the need for enhanced educational initiatives beyond the formal medical curriculum to equip future healthcare professionals with the knowledge and skills required to educate patients and promote safer cosmetic practices.

As one of the few studies addressing this issue in Pakistan, the study contributes valuable evidence to the growing body of literature from South Asia, a region where skin lightening practices remain prevalent. Further research using larger, nationally representative samples and more robust methodologies is needed to strengthen the evidence base and inform educational, public health, and regulatory interventions.

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