

Knowledge, Attitude, and Practice regarding Glutathione Whitening Treatment among the general population in a cosmopolitan city of Pakistan

Farzana Faiz¹, Mahwash Rana^{2*}, Muneeza Qamar³, Sibaal Kashif¹, Tabish Ali¹, Mujtaba Awais Qureshi

¹Department of Dermatology, Rashid Latif Khan University Medical College, Lahore.

²Department of Dermatology, Surraya Azeem Teaching Hospital, Lahore.

³Department of Dermatology, Al-Aleem Medical College, Lahore.

Abstract

Background Glutathione (GSH) Whitening Treatment has recently gained popularity as a cosmetic intervention to attain fairer skin tones. It is being used widely, especially, in urban areas where aesthetics clinics are administering intravenous GSH as whole body whitening therapy.

Objective The objective of this study is to determine the knowledge, attitude, and practice regarding the use of glutathione in Lahore, Pakistan.

Methods A cross-sectional study was carried out among 353 people of various age groups. A validated questionnaire was used to collect data using online Google platform. Data was analyzed on SPSS version 25, the categorical data was presented through frequency and percentages.

Results Among the 353 respondents, 44.5% (157) were aged 20 years or below while 42.5% (150) were between the ages of 21 and 30 years. 57.5% (203) were females and 36.9% (130) had a medium skin tone. 71.4% (252) of the respondents were familiar with the idea of GSH mainly through social media (59.9%; 151) or family and friends (53.2%; 134). Only 34.3% (121) had used GSH for skin lightening, most commonly in injectable form (83; 68.6%). Female gender and dark skin tone was significantly associated with use of GSH for skin lightening.

Conclusion Individuals with a dark skin and female gender were more likely to use GSH. However, more research is needed on the psychosocial factors driving GSH use. GSH-related social media content should be better monitored by the authorities and public health campaigns should encourage inclusive and healthier beauty standards.

Keywords Glutathione Whitening treatment; Skin tone; Skin lightening; Knowledge; Awareness.

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Introduction

In recent times, skin whitening treatments (SWTs) or skin lightening products (SLPs) has gained significant popularity in many parts of the world.¹

Address for correspondence

Dr. Mahwash Rana, Consultant Dermatologist,
Surraya Azeem Teaching Hospital, Lahore.
Ph: 03024636248
Email: anamash@live.com

While there is greater preference for skin lightening amongst females, both genders equally indulge in it, with the majority falling in the 20 to 30 years age bracket, particularly in Asian countries.²

Among various skin-lightening agents, glutathione (GSH) has emerged as a popular choice due to its efficacy and relative safety compared to traditional agents.³ GSH can be administered orally, intravenously, or topically, and its use for skin

whitening has been widely promoted in cosmetic and aesthetic practices. It acts as an inhibitor of tyrosine kinase and also promotes the shift from the darker eumelanin to the lighter pheomelanin.⁴

Many researchers worldwide have focused on the reasons behind use of SWT. However, despite the increasing use of GSH no research has been conducted that focuses specifically on factors involved in its use.

In one study conducted in Saudi Arabia by Bamerdeh *et al.* 41.8% of the 409 participants were between the ages of 20-30 years and 35.7% participants had used an SLP at least once.⁵

Sayed and co-workers observed that among 200 female students at Ahfad University in Sudan, with a mean age of 23 years, 63% used SLP, but out of these only 39% reported any side effects.⁶ It was further noted that the most common source of information about SWT was media (49%), followed by family and friends (28%).

In a research conducted by Amodu *et al.* in Nigeria, about half (51.9%) of the 395 cases belonged to the age range of 20-24 years. 48.1% of respondents were using skin lightening, of which 50% had been using it for more than 1 year.⁷

In Pakistan, there is limited awareness regarding proper usage, potential side effects, and long-term implications of GSH use. The present study aims to assess the knowledge, attitudes, and practices (KAP) related to GSH whitening treatments. By evaluating public awareness, misconceptions, and usage patterns, this research seeks to identify gaps in understanding and potential risks associated with unsupervised or improper use of GSH.

Methods

This cross-sectional study targeted the residents of Lahore, Pakistan. Both genders were enrolled in the present study using Convenience sampling. No

specific age limit was set.

The inclusion criteria was individuals of both genders of any age residing in Lahore city and could understand the online questionnaire

Study Duration: 3 months

Sample Size

A sample size of about 384 was calculated using the Cochran formula for a large population.

$$n = \frac{z^2 \times p \times q}{e^2}$$

The sample size equals the square of the z-score (corresponding to the desired confidence level) multiplied by the expected proportion 'p' (expressed as a decimal), multiplied by 'q' (where q = 1- p), all divided by the square of 'e' (the acceptable margin of error, expressed as a decimal).

We calculated sample size taking z equal to 1.96 corresponding to confidence level 95%, p as 0.5 taking expected proportion 50% and e as 0.05 allowing margin of error 5%.

The data was collected using a structured, pre-validated Knowledge, Attitude, and Practice (KAP) questionnaire to assess participants' understanding and behaviors regarding GSH use. The tool was originally developed by Tesfamariam *et al.* and published under a Creative Commons Attribution-Non Commercial license.⁸ It was modified for the purpose of the present study on GSH. Content validity was re-assessed by a panel of three subject experts, and face validity study enrolling 20 participants confirmed clarity and comprehensibility. Cronbach alpha was not calculated because the pilot sample size (n=20) was insufficient to produce a stable reliability estimate. The results of the pilot test were not included in the study results.

The questionnaire consisted of two sections: one section for demographic data and a second section

subdivided into three sub-sections: knowledge (2 dichotomous yes/no questions and four multiple-choice items), attitude (3 questions rated on a 5-point Likert scale and one multiple choice question), and practice (4 dichotomous yes/no questions and 4 multiple-choice questions).

It was administered online via Google Forms to 400 participants through an online link shared on WhatsApp. Participants completed the form voluntarily and anonymously, and no incentives were offered.

Ethical approval was obtained from IRB board of Rashid Latif Khan University Medical College (Reference number: RLKUMC/IRB/0036/24 dated 28.08.2024). The respondents were informed about the purpose of the research, consent was obtained electronically and they were free to withdraw from the research at any time. Data was anonymised to ensure confidentiality.

The responses were transferred to Google sheets and the data was analysed using SPSS version 25. About 47 questionnaires were rejected due to incomplete responses. Categorical data was presented through frequency and percentages. Chi square test was used to assess associations between GSH use and demographic features of the participants. A *P*-value <.05 was considered statistically significant.

Result

A total of three hundred and fifty-three (353) questionnaires were filled completely. **Figure 1** shows the demographic features of the respondents. Females were slightly more 57.5% (n=203) while 42.5% (n=150) were males. The skin tone of 26.6% (94) participants was fair, while 36.9% (130) had a medium complexion. The remaining 36.5% (129) subjects stated to have dark skin.

About two-thirds (66.6%; 235) were familiar with the idea of melanin and 71.4% (252) had heard of GSH before this study. **Table 1** shows the sources of

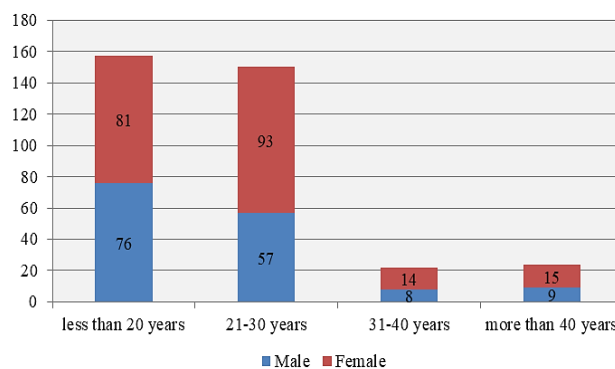


Figure 1 Demographic Features of the study (n=353).

Table 1 Sources of Information on Glutathione (n=252).

Source	Number (n)	Percentage (%)
Social Media	151	59.9
Family and friends	134	53.2
Aesthetic clinics	114	45.2
Advertisements	108	42.9
Hospitals	102	40.5
Offices/ Educational institutes	86	34.1
Miscellaneous sources	54	21.4

information regarding GSH. Several participants reported multiple sources.

A majority (65.4%; 231) of the respondents believed that GSH was used as a whitening product. But only 43.6% (154) knew about its action as tyrosinase inhibitor.

Some believed that injection yielded the best results for skin whitening (27.8%; 98). However, only 11.6% (n=41) considered that tablets were the best method of GSH administration.

Most of the respondents considered that SWT products are harmful (66%; 233) and more than one third of the participants (36.5%; 129) were of the opinion that their use should be discouraged. The main reasons for this were ethical and social concerns (84.5%; 109). 41.4% (146) of respondents thought that GSH should be available as an over-the-counter medicine, while 25.2% believed that it should not be available over-the-counter.

More than half the people who attempted the

Table 2 Demographics of Glutathione use (n=353).

Demo-graphic factor	Undergone Glutathione Skin Whitening		Total (n)	P-Value
	No	Yes		
	n (%)	n (%)		
Gender				<.001
Male	115 (76.7)	35 (23.3)	150	
Female	117 (57.6)	86 (42.4)	203	
Age group				.329
20 or below	105 (66.9)	52 (33.1)	157	
21-30	98 (65.3)	52 (34.7)	150	
31-40	11 (50)	11 (50)	22	
40 or above	18 (75)	6 (25)	24	
Skin Tone				<.001
Fair	74 (78.7)	20 (21.3)	94	
Medium	102 (78.5)	28 (21.5)	130	
Dark	56 (43.4)	73 (56.6)	129	
Total	232	121	353	

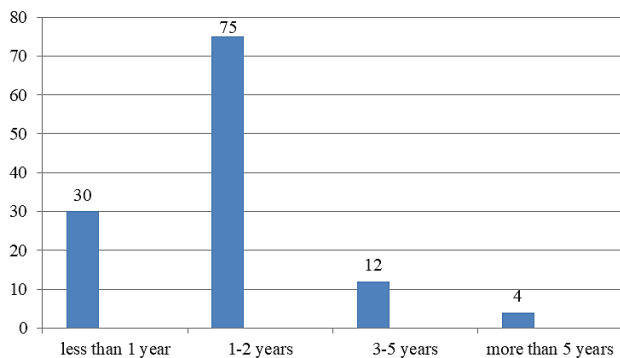


Figure 2 Duration of use of Glutathione (n=121).

questionnaire (57.8%; 204) had not undergone whitening treatment. 42.2% (149) of respondents had undergone a whitening treatment at least once in their lifetime and 38.5% (136) were still using some form of SWT. Among these 121 (34.3%) had used GSH for skin lightening. **Table 2** shows the demographics of respondents using GSH. Female gender and dark skin was significantly associated with use of GSH.

The route of administration was reported as injectable GSH by 83 participants, accounting for 68.6% of the 121 cases that had used GSH, in addition to other SWT formulations such as various combinations of lotions, creams, serums or tablets. **Figure 2** shows how long the subjects had used GSH.

Main reasons for using GSH were skin tone

lightening (24%; 29), treating hyperpigmentation (19.8%; 24) or both (45.5%; 55) while the rest had used it due to peer pressure. 79.3% (96) participants had noticed changes in their skin after using GSH while 20.7% (25) had seen no change.

Table 3 shows the common side effects experienced by people after the use of GSH. 95.9% of the subjects had experienced cutaneous adverse effects with GSH.

Discussion

The majority of our 353 respondents were young: under 20 years (44.5%) or under 30 years (42.5%). This is most likely due to the availability and familiarity with digital devices at these ages as well as a greater awareness of current aesthetic trends. There was a slight female majority (57.5%) compared to males (42.5%).

In a recent research conducted by Asif and colleagues on SLP use in Lahore, the age range of the 266 participants was between 15 and 24 years and the predominant majority were females (90.6%).⁹ Noreen *et al.* also observed SLP usage in 295 cases from Lahore but they only enrolled girls and women.¹⁰ The majority of their subjects were less than 35 years: 57.6% between 18 to 26 years and 25.1% between the ages of 27 and 35 years. Similarly, among the 422 participants surveyed by Wudiri *et al.* from Nigeria, about two-thirds of their participants were females (67.5%) and 60% cases were aged between 15 and 24 years.¹¹

However, most international studies on SLPs focus on young females.^{12,13} Many of these studies have been undertaken in African and Asian countries

Table 3 Observed Side Effects of Glutathione (n=121).

Side Effect	Number (n)	Percentage (%)
Skin rash/allergic reactions	96	79.3
Acne	73	60.3
Eczema	35	28.9
Skin discoloration	34	28.1
GIT issues	29	24
Kidney issues	12	9.9

probably due to the high prevalence of SWT use in the naturally darker coloured local population.^{14,15} Tesfamariam and coworkers from Africa surveyed 684 females using SLPs in Asmara, Eritrea.⁸ Similarly Khalil studied knowledge and use of SLPs by 365 female undergraduates in Sudan.¹⁶

The skin tone of about a quarter of our participants was fair, and the rest were medium to dark-complexioned. Asif *et al.* also observed that 23.3% of their cases had a fair skin tone.⁹ However, Khalil reported more than half (56.2%) of their 365 subjects to be fair skinned.¹⁶ The latter study did not have a medium tone category, which might account for this trend.

Among the 353 enrolled cases in the current research, 71.4% of the participants knew about GSH. Similarly, Wudiri and coworkers from Nigeria found that a very high ratio 90.3% (n=381) of their 422 subjects was aware of SLPs.¹¹ Tesfamariam *et al.* from Asmara, Eritrea also reported that 94.9% of their 684 participants knew about SLPs.⁸ The very high SLP awareness percentage observed in the later study may be due to selection bias, as they chose their study sample from women attending local beauty salons. This sub-group of the population may already be previously sensitized to aesthetic products like SLPs.

In the current research, among the 252 individuals who knew about GSH the most common source of information was social media (59.9%) closely followed by family and friends (53.2%). Most of the cases cited multiple information sources.

Several other researchers have also observed that most of their subjects get their SLP information from friends or social media. Egbi and Kasia reported social media source in about three-quarters 73.6% of 110 participants.¹⁷ Wudiri *et al.*; Okoro *et al.* and Badulla *et al.* noted that 39%, 45.3% and 64.9% of their participants respectively cited friends as information source of SLP.^{11,18,19}

Among the participants of the present study around

two-fifths (38.5%) were currently using SLPs, mainly GSH (34.3%). This is similar to the results documented by Wudiri *et al.* who reported that about one-third (32%) of their study cases were current users of SLPs.¹¹ Likewise Nyoni-Kachambwa and co-researchers from Thailand reported this ratio at 31.1% of 260 cases.²⁰ Other researchers have documented slightly lower ratios of current SLP use such as Ayyash *et al.* from Jordan (18%) and Beshir *et al.* from Dubai (24.6%).^{21,22}

On the other hand, Alrayyes, Alrayyes and Farooq from Saudi Arabia observed that more than half (53.2%) of their 760 respondents had used a SLP within the last year.²³ However, among these only 197 reported using SLPs more than 10 times during this period, which comes upto 25.9% of the total respondents and is consistent with other related research.

Statistical analysis of the demographic features of GSH users and non-users revealed a significant correlation between female gender and darker skin tone and GSH usage. However, no influence of age on GSH skin whitening was observed. Bakare *et al.* from Nigeria also observed this trend among their 296 cases and reported that about two-thirds (64.1%) females used SLPs compared to only around one-third (31.7%) males.²⁴

Many studies, however, have not reported any significant role of skin tone on SLP use.^{22,25} There is a possibility that since intravenous (IV) GSH can potentially improve whole body skin tone, the darker-skinned individuals are more predisposed to use it. Furthermore, as it requires supervised administration under clinical setting the lighter-toned subjects are relatively reluctant to undergo this therapy.

The main route of GSH administration was via injection (infusion) in 68.6% of our participants. However, researchers on SLPs have routinely observed creams or serums as the major method of application, while injections are the least preferred

routes. Badulla *et al.* noted that 83.8% of their subjects used creams as SLPs while only 2 individuals (1.3%) had used injections.¹⁹ Similarly Alrayyes and Farooq documented creams, serums and injection for skin lightening in 45.4%, 39.5% and 0.2% cases respectively.²³ Khalil reported that almost all of their 140 subjects (97.1%) practicing skin lightening used creams for this purpose.¹⁶

This difference in the practice of traditional SLPs in previous research compared to the present study on GSH is most likely due to the pharmacokinetics and mechanisms of actions of the involved products.

In the current study, the majority (75.2%) of GSH users had been using it for more than one year. Badulla *et al.* noted that 83.8% cases had been using SLPs between 1 and 5 years.¹⁹ However, Al-Kathiri and Joseph from Oman reported that 74% of their cases had been using SLPs for less than 1 year.¹³ Similarly, Khalil from Nigeria also reported that 88.6% of their cases had been using SLPs for less than 1 year.¹⁶ The shorter durations noted in the latter studies could be due to the comparatively younger age of the participants, many of whom were less than 20 years of age, compared to the former studies.

Side effects were very common in the subjects using GSH and 95.9% of the individuals had experienced one or more cutaneous adverse effect. Zubair, Hafeez and Mujtaba documented systemic side effects in 100% of their IV GSH cohort.²⁶ Since the side effects were self-reported and many subjects in the current study were also using topical whitening formulations in addition to GSH, it is possible that some cutaneous effects were misattributed as being due to GSH.

Several studies on SLPs have documented a high incidence of cutaneous adverse effects such as acne, irritation, redness or skin thinning. Tesfamariam *et al.* and Beshir *et al.* noted localised cutaneous side effects in 43.7% and 36% of their cases, respectively.^{8,22} On the other hand, only 18.6% of

SLP user had any adverse reaction in the survey by Khalil on Sudanese females.¹⁶ Since most of Khalil's subjects had only used SLPs for comparatively short durations: 30.7% for less than one month and 49.3% for 1 to 6 months, it is likely that some side effects associated with longer usage had not manifested at the time of their survey.

Some limitations of our study were that the study was conducted in a cosmopolitan city, which may not be representative of more rural population of Pakistan. Also, the use of an online survey may have excluded participants who do not have access to the internet, potentially limiting the diversity of the sample.

Future studies can address these limitations by using paper-based questionnaires in addition to online ones and expanding the area of research to rural population.

Conclusion

About two thirds of the participants knew about GSH but only one-third had used GSH-based skin whitening. Individuals with a dark skin and female gender were more likely to use GSH. There is a pressing need for further research into the psychosocial factors influencing the adoption of GSH skin lightening

Declaration of patient consent Authors certify that they have obtained all appropriate patient consent.

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Author's contribution

FF, MR: Substantial contributions to study design, acquisition of data, analysis and interpretation of data, manuscript writing and revising it critically.

MQ, SK, TA, MAQ: Substantial contributions to study design, acquisition of data and manuscript writing.

Every author has given final approval of the manuscript version to be published and agreed to be accountable for all aspects of the work.

References

1. Pollock S, Taylor S, Oyerinde O, Nurmohamed S, Dlova N, Sarkar R, *et al.* The dark side of skin lightening: An international collaboration and review of a public health issue affecting dermatology. *Int J Women's Dermatol.* 2021 Mar 1;**7(2)**:158-64.
Doi: <https://doi.org/10.1016/j.ijwd.2020.09.006>
2. Peltzer K, Pengpid S, James C. The globalization of whitening: prevalence of skin lighteners (or bleachers) use and its social correlates among university students in 26 countries. *Int J Dermatol.* 2016 Feb;**55(2)**:165-72.
DOI: <https://doi.org/10.1111/ijd.12860>
3. Alzahrani TF, Alotaibi SM, Alzahrani AA, Alzahrani AF, Alturki LE, Alshammari MM, *et al.* Exploring the Safety and Efficacy of Glutathione Supplementation for Skin Lightening: A Narrative Review. *Cureus.* 2025 Jan 27;**17(1)**: e78045.
DOI: <http://doi.org/10.7759/cureus.78045>
4. Mahmood M. The effectiveness of glutathione on skin lightening: a review. *Int J Med Sci.* 2022 May 14;**5(2)**:5-16.
DOI: <http://doi.org/10.32441.ijms.5.2.2>
5. Bamerdah S, Alhothali OS, Aldajani BM, Alghanemi L, Mleeh NT. A cross-sectional study of the knowledge, practice, and attitude towards skin-lightening products among the general population in the western region of Saudi Arabia. *Cureus.* 2023 Jan 22;**15(1)**:e34069.
DOI: <https://doi.org/10.7759/cureus.34069>
6. Sayed S, Sayed AE, Amin MHJ, Suliman WY, Eltahir HB. Knowledge Attitude and Practice of Skin Whitening Products among Students in Ahfad University for Women. *Int J Clin Med Edu Res.* 2024;**3(1)**:1-6. Available from <https://www.opastpublishers.com/open-access-articles/knowledge-attitude-and-practice-of-skin-whitening-products-among-students-in-ahfad-university-for-women.pdf>
7. Amodu MO. Knowledge, attitude and practice of skin whitening among female university students in Northeastern Nigeria. *Open Access Lib J.* 2018;**5(04)**:1.
DOI: <https://doi.org/10.4236/oalib.1104501>
8. Tesfamariam S, Bahta M, Weldemariam DG, Tesfamariam EH, Yemane H, Bahta I, Russom M. Awareness, perception, and utilization of skin lightening agents among females of Asmara, Eritrea: a cross-sectional study. *Clin Cosmet Investig Dermatol.* 2023 Dec 31:1191-202.
DOI: <https://doi.org/10.2147/CCID.S396686>
9. Asif M, Riaz MR, Shadab H, Khan A, Hassan A, Iqbal S. Prevalence of Skin Lightening Product Usage among the Young Generation in Lahore after Puberty: A Comprehensive Study. *Saudi J Med.* 2024;**9(1)**:1-6.
DOI: doi.org/10.36348/sjm.2024.v09i01.001
10. Noreen N, Perveen R. Skin Lightning Practices Among Women Living in Lahore; Its Prevalence, Effects, Determinants and Awareness. *J Biol All Health Sci.* 2025 Mar 14;**5(1)**:97-102.
DOI: <https://doi.org/10.56536/jbahs.v5i1.120>
11. Wudiri ZW, Bolori MT, Bukar FL, Oloyede T, Amodu MO, Abulfathi AA, *et al.* Knowledge, Perception and Practice of Skin Bleaching among Adults in Northeastern Nigeria. *Open Acces Lib J.* 2024 May 9;**11(5)**:1-26.
DOI: <https://doi.org/10.4236/oalib.1111390>
12. Yayehrad AT, Lule A, Tebabal AT, Esmael M, Risqey N, Temesgen S, Negash S, Hamid S, Tasew S, Mekonen S, Siraj EA. Concern on skin lightening product safety: Level of awareness and associated factors among female users in Bahir Dar City, Ethiopia. *Clin Cosmet Investig Dermatol.* 2023 Dec 31:1753-61.
DOI: <https://doi.org/10.2147/CCID.S416460>
13. Al Kathiri MA. Knowledge, Attitude, and Practices on the Use of Bleaching Agents Among Students in the University, Al Dakhliya Governorate, Sultanate of Oman. *Res J.* 2022 June;**297(E)**:139-44. Available from <https://www.researchgate.net/profile/Jiji-Joseph/publication/375450451>
14. Sagoe D, Pallesen S, Dlova NC, Lartey M, Ezzedine K, Dadzie O. The global prevalence and correlates of skin bleaching: a meta-analysis and meta-regression analysis. *Int J Dermatol.* 2019 Jan ;**58(1)**:24-44.
DOI: <https://doi.org/10.1111/ijd.14052>
15. Jagadeesan S, Kaliyadan F, Ashique KT, Karunakaran A. Bleaching and skin-lightening practice among female students in South India: a cross-sectional survey. *J Cosmet Dermatol.* 2021;**20(4)**:1176-81
DOI: <https://doi.org/10.1111/jocd.13689>
16. Khalil RA. Knowledge, Attitude and Practice of Skin Whitening Products, Among Sudanese Undergraduate Females, 2021. *Research Square.* 2022:1-17.
DOI:<https://doi.org/10.21203/rs.3.rs-1221251/v1>
17. Egbi OG, Kasia B. Prevalence, determinants and perception of use of skin lightening products among female medical undergraduates in Nigeria. *Skin Health Dis.* 2021 Sep;**1(3)**:ski2-46.
DOI: <https://doi.org/10.1002/ski2.46>

18. Okoro E, Barminas R, Olarinoye G, Magaji D, Umar O. Knowledge, attitude and practice of skin bleaching among adolescents in Keffi, North-central Nigeria. *Nig J Dermatol.* 2022 Dec 30;**12(2)**:37-45 Available from <https://nigjdermatology.com/index.php/NJD/article/view/189>
19. Badulla WF, Alshakka M, Ibrahim MI. Reported Side-Effects of Using Skin-Lightening Products in Aden-Yemen: Knowledge, Attitude and Practice. *J Pharm Res Int.* 2022;**34(53A)**:31-41. DOI: <https://doi.org/10.9734/JPRI/2022/v34i53A7225>
20. Nyoni-Kachambwa P, Naravage W, James NF, Van der Putten M. A preliminary study of skin bleaching and factors associated with skin bleaching among women living in Zimbabwe. *Afri Health Sci.* 2021;**21(1)**:132-9. DOI:<https://dx.doi.org/10.4314/ahs.v21i1.18>
21. Ayyash M, Jaber K, Nassar RI, Fino L, Mango L, Abuodeh A. Skin-lightening products and Jordanian women: Beliefs and practice. A cross-sectional study. *PloS One.* 2023 Nov 21;**18(11)**:e0293896. DOI:<https://doi.org/10.1371/journal.pone.0293896>
22. Beshir S, Al-Gailani ES, Ramadan D, Bassam G, Maher E, Ismail S, *et al.* Women's knowledge, perception, practice, and experience of using of skin-lightening products in the United Arab Emirates (UAE): A cross-sectional survey. *J Public Health Res.* 2023 Oct;**12(4)**: 22799036231204356. DOI:<https://doi.org/10.1177/22799036231204356>
23. Alrayyes SF, Alrayyes SF, Farooq UD. Skin-lightening patterns among female students: a cross-sectional study in Saudi Arabia. *Int J Womens Dermatol.* 2019 Sep 1;**5(4)**:246-50. DOI: <https://doi.org/10.1016/j.ijwd.2019.04.026>
24. Bakare OQ, Oluwole EO, Anyanwu-Iyah EH, Aworinde OG, Lawal EO. Skin lightening: knowledge, attitude, practices and the motivations for its use among the residents of Ikeja local government area, Lagos. *Ann Health Res.* 2023 Mar 26;**9(1)**:1-1. DOI: <https://doi.org/10.30442/ahr.0901-01-185>
25. Banala M, Mamidipaka A, Ogunleye T. Skin-lightening product use among south asian americans: Cross-sectional survey study. *JMIR Dermatol.* 2023 Nov 2;**6(1)**:e49068. DOI: <https://doi.org/10.2196/49068>
26. Zubair S, Hafeez S, Mujtaba G. Efficacy of intravenous glutathione vs. placebo for skin tone lightening. *J Pak Assoc Dermatol.* 2016;**26(3)**:177-81. Available from: <https://www.jpapd.com.pk/index.php/jpad/article/view/18>.