

## Original Research Article

### **Reported Side-Effects of Using Skin-Lightening Products in Aden-Yemen: Knowledge, Attitude, and Practice**

#### **ABSTRACT**

**Background:** Skin lightening creams & products (SL) contain certain dangerous chemicals such as mercury, steroids such as; Clobetasol propionate (CP), hydroquinone (HQ), and a host of others that have negative health implications.

**Aims:** The study focused on the knowledge, attitude, and practices (KAP) of using these creams, as well as reporting the most common side-effects related to using these products.

**Methods:** This study design was a cross-sectional study from August to October 2021, conducted in different governmental and private dermatological clinics and community pharmacies in Aden-Yemen.

**Results:** A total of 154 women were involved in this study, 58.4% in the age range from 21 to 30 years. About 57% were single and had a high level of education; 61.0% of the participants were university graduates. Nearly half (51.9%) of the participants agreed that they used the SL product due to the climate condition. Around two-thirds (67.5%) of them did not know the ingredients of the SL product. About three-fourth (74.7%) knew that SL products might cause unwanted side effects to the skin. Nearly half (53.9%) of participants used SL products to get light skin tone, 23.4% used them for medical purposes, and 23.4% used them for both purposes. Most females had a good practice of stopping using these products during pregnancy (90.9%) and breastfeeding (88.3%). The most reported side effects of using SL products were acne vulgaris (44.2%),

followed by pigmentation (26.0%), skin atrophy (22.1%), and the appearance of lines on the skin (striae) (20.1%).

**Conclusions:** A significant proportion of respondents in the cross-sectional study had overused and misused bleaching agents regardless of age, income, education, or marital status. Continuous use of these products without control will lead to complicated side effects on the skin and overall body systems.

**Keywords:** Skin lightening, Clobetasol propionate, hydroquinone, side-effects.

UNDER PEER REVIEW

## 1. INTRODUCTION

The term "skin lightening" refers to various cosmetic procedures used to lighten the skin. To achieve a lighter skin color, SL, also known as skin bleaching or skin whitening, involves the application of topical treatments containing corticosteroids, HQ, mercury, and a range of other chemicals.

HQ and CP are used in lightening products to bleach the skin for beautification or medical purposes. These substances can cause severe problems if not used with precautions and under the physician's care. Skin bleaching has been established to have severe side effects [1]. It has also been recognized as a source of severe health-related results among users, particularly those who exposed their bodies to creams produced without sufficient safety procedures regarding the chemical components employed in their manufacturing. Skin bleaching has also been linked to skin cancer, skin discoloration, and despair in users, leading to harmful consequences and suicide attempts. [2, 3].

SL products may treat a pigmentary disorder like melasma, although it's more commonly used for cosmetic reasons. In Africa, Asia, and many other parts of the world, SL products are widely used as cosmetics. According to a recent meta-analysis, the global pooled lifetime prevalence of skin-bleaching agents was 27.7%, with Africa having a prevalence of 27.1%. The authors alerted that the findings represented a severe worldwide public health issue and emphasized the importance of epidemiologic research in underrepresented areas. [4].

The use of products containing SL compounds is a growing trend in several parts of the world, including Yemen, especially among females [5]. Due to the common social assumption that light skin is more attractive, beautiful, and representative of a high social position, women are under pressure to lighten their skin. [6]. As a result, the use of these products has increased, perhaps increasing the incidence of adverse events associated with their use [7, 8].

Most whitening products contain HQ, corticosteroids with high potency, and mercury salts as active ingredients [5]. These chemicals could be extremely harmful in some concentrations; therefore, they are banned in many countries worldwide. Several studies confirm the potential hazard of using the compounds mentioned above. Hydroquinone and mercury are banned in some countries but are still sold in Yemen. Individuals make many locally-made creams by mixing several lightening creams without considering the ingredient percentages from each mixed cream. This may lead to a high concentration of some contents in the final products. In addition, they may mix different products with the same active ingredient to make their creams more effective in skin lightening.

The adverse reactions to skin whitening have significantly increased in recent years [7, 8]. Different dermatological adverse reactions and consequences have been recorded with other whitening products, for example, ochronosis, skin infections such as erysipelas and dermatophytes, striae, telangiectasia, and acne [9]. Also, prolonged use of corticosteroids has always been associated with Cushing's syndrome and renal impairment [10]. Moreover, serious neurological complications have been associated with using mercury compounds as whitening creams [11].

Despite the widespread use of these products, the rate of detecting side effects associated with their use is relatively low. Lack of information concerning the type, the number, and the severity of these side effects could partly be due to the absence of a reporting system [12, 13] or the under-reporting associated with spontaneous side effects reporting systems [14]. The study focused on the knowledge, attitude, and practices (KAP) of using these creams. They hypothesized that underlying beliefs about skin color perpetuate this practice despite awareness of potential adverse effects. The current study is considered the first of its kind in Yemen. The

literature review revealed that there is no study conducted in Yemen related to the determination of the side-effects of the SL products, attitudes, and practices of using these products.

## **2. MATERIALS AND METHODS**

### **2.1 Study Design**

This study design was a cross-sectional study from August to October 2021. It was conducted in different governmental and private dermatological clinics and community pharmacies in Aden-Yemen. The community pharmacies were included in this study because some women seek the pharmacist's help and consultation for mild side effects.

### **2.2 Data Analysis**

The data were entered into Microsoft Excel and analyzed using SPSS version 24. Descriptive statistics were used to determine the most common side-effects of using SL products and related KAP parameters.

### **2.3 Ethical Consideration**

The Ethics Research Committee of the Faculty of Medicine and Health Sciences, Aden University, approved the study.

## **3. RESULTS AND DISCUSSION**

Skin-lightening agents are professionally prescribed for specific medical disorders. Still, they are also commercially and widely available without a prescription for cosmetic or other purposes from sellers on the street and over the counter in medicine or cosmetics shops with no control. Skin-lightening treatments are widely used; however, they have various side effects [15].

This study aims to reveal female KAP levels and the most commonly reported adverse effects of utilizing SL creams. It tends to highlight the havoc this behavior causes and the related

attitude of individuals who engage in it. The findings will aid in determining ways to avoid the risks linked with the usage of skin whitening agents. More importantly, the research allows the government to help guide policymakers in reducing the damaging practice of arbitrary and indiscriminate skin whitening.

### **3.1 Socio-Demographic Data of Participants**

Most of the respondents belong to the age range from 21 to 30 years (58.4%). More than half of them were single (57.1%) and had a high level of education (61.0%). The skin tone ranged between light (47.4%) and brown (45.5%) and only 7.1% had black skin. The skin type was mixed (40.9%) followed by oily (35.7%) then dry (23.4%). Most of the participants get advice for the treatment of the side effects from the community pharmacist (90.9%). The result is illustrated in Table 1. It is expected that more educated females would be more conscious of the health risk of these products, however, in this study, most of the participants were university graduates or had a secondary school level. That means, they still use these products even after knowing the related side-effect only because they want to have lighter skin and a beautiful complexion. Therefore, they used SL products extensively regardless of age, educational level, or marital status.

### **3.2 Knowledge and Attitude of Participants (KAP) toward SL Products**

About half of the participants agreed that they used the SL product due to the climate condition (51.9%) because Aden is a hot coastal city with hot summer with high humidity, which leads to the darkening of the skin. They also agree that using SL products can be addictive (51.3%) because they cannot stop using them. About 42% of the female disagree that using SL products should only be used for medicinal purposes. The result is shown in Table 2.

Around 67% of them did not know the ingredients of the SL product. Although most of the participants are educated, they are unaware of the components of these materials. About 75% knew that SL products may cause unwanted side effects to the skin, which means that they had a reasonable level of knowledge. Only 6% did not think so. The reported percentage is slightly higher than the study carried out in Saudi, where 55% of the respondents believed that using bleaching creams could harm their skin, whereas 45.4% did not think so [16].

### 3.3 Practices of Women Using SL Products for the Skin

Most of the respondents were advised by their friends to use these products (64.9%). About 52% of them were currently using SL products. Of the participating women, 52.6% were current users of SL products, and 47.4% were not. The results of this survey indicate that using SL products is very common among women. The result was higher than the study in Saudi Arabia (38.9%), [16], also another study in Saudi Arabia showed only 25% of the women were current users of skin-bleaching agents, while 39.6% were only previous users. However, a study in Nigeria and Senegal showed that cosmetic bleaching products ranged from 53% to 59% of people surveyed [17, 18]. The closeness of these results with Nigeria and Senegal may be due to having dark skin and due to environmental reasons, as these countries have hot summers.

*[insert Table 1 here]*

**Table 1.** Socio-demographic data of participants

Variables	n=154 (%)
<b>Age group (years)</b>	
(18-20)	25 (16.2)
(21-30)	90 (58.4)
(31-40)	29 (18.8)
(41-50)	7 (4.5)

Above 50	3 (1.9)
<b>Marital status</b>	
Single	88 (57.1)
Married	66 (42.9)
<b>Education</b>	
Illiterate	11 (7.1)
Primary school	8 (5.2)
Secondary school	41 (26.6)
University	94 (61.0)
<b>Study location</b>	
Community pharmacy	140 (90.9)
Dermatological clinics	14 (9.1)
<b>Skin tone</b>	
Light	73 (47.4)
Brown	70 (45.5)
Black	11(7.1)
<b>Type of Skin</b>	
Dry	36 (23.4)
Oily	55(35.7)
Mixed	63 (40.9)

Most of them have been using these products for 1-5 years (83.8%) and only (16.2%) have been using SL products for 5-10 years. The duration of using SL products differs from one study to another, a study reported the duration of usage varied from 1 to 12.5 year (mean  $12.3 \pm 23.7$  months); of the respondents, 18.6% had used bleaching creams continuously for more than 6 months [16]. While in Senegal, the duration varied from 1 to 35 years [18].

Around (82.5%) of them bought these products from pharmacies, (15.6%) bought them from cosmetic stores, and (1.9%) from supermarkets. That means the SL products are sold in cosmetic stores and supermarkets, indicating the widespread sale of these products. A study in Saudi Arabia revealed that 38% of women obtained them by medical prescription and 27.8% were from the pharmacy without a prescription [19].

Nearly (53.9%) of participants used SL products to get light skin tone, (23.4%) used them for medical purposes, and (23.4%) used them for both purposes (22.7%). The study in Saudi (26.7%) reported that they used bleaching products for medical purposes to treat localized abnormal skin hyperpigmentation. While 73.6% of participants desired lighter skin color, only 19.9% did not, the % is near the current study [16].

*[insert Table 2 here]*

**Table 2.** Knowledge and attitude of participants toward SL products

<b>Variables</b>	<b>n=154 (%)</b>
<b>Do you use skin whitening agents because of the environment in which you are located?</b>	
Agree	80(51.9)
Neutral	30 (19.5)
Disagree	44 (28.6)
<b>Can SL products be addictive?</b>	
Agree	79 (51.3)
Neutral	29 (18.8)
Disagree	46 (29.9)
<b>Do you think that using SL products should only be used for medicinal purposes?</b>	
Agree	57 (37.0)
Neutral	31 (20.1)
Disagree	66 (42.9)
<b>Do you know the ingredients of the SL product?</b>	
Yes	50 (32.5)
No	104 (67.5)
<b>SL products may cause unwanted side effects to the skin?</b>	
Agree	115 (74.7)
Neutral	29 (18.8)
Disagree	10(6.5)

About 60% of the females used exported products, and the rest of the participants used local mixed creams products (39.6%). The percentage of females that were using the local mixed creams is relatively high in comparison with the study in Saudi Arabia where non-medical preparations sold by street vendors and at herbal shops were considered by 15.3% as safe to use, while 69.8 % disagreed [16]. This percentage is considered a dangerous indicator that warns of the occurrence of multiple health problems in the future if the distribution and sale of these products are not subject to any control or restriction.

Half of the females used only one product and the other half used between 2 to 5 products, indicating that most of the participants attempted to get an efficient skin lighting effect in a short period. Most females had a good practice of stopping using these products during pregnancy (90.9%) and breastfeeding (88.3%). The result is very similar to the study in Saudi, where 10.3% of women continued applying the bleaching products throughout pregnancy, while 20.8% did so during lactation [16]. The results were more drastic in Senegal, where 81% of the women carried on with their use during pregnancy and 87% did so during lactation [18].

Nearly 57.8% of them got a fast-whitening effect and 68.8% were satisfied with using these products. More than half of the females (63.6%) used them only once daily and 21.4% more than once/day, and 14.9% 2-3 times/week. A higher percent (80.6%) of using these products once daily was also reported [16].

About 50.0% of the participants applied them to the face and some other parts of the body, only 14.3% applied them all over the whole body, and 35.1% applied them only on the face. The percentage of applying them on the face is lower than in the study in Saudi Arabia where 64.6% of the participants used the products on their faces, 26.7% used them on their necks and 17.1% used them on their hands, and 7.3% of the cases were applied to the whole body. [16].

Also, the percentage of applying them all over the body is lower than in Nigeria (81.3%) and Senegal (92%) [18].

Regarding the ease of stopping using these products, 29.9% said that it is somewhat easy and only 9.7% said that it is difficult. About 34.4% were advised by the physician or pharmacists to stop using them, 43.5% by a family member, and 22.1% by friends. Only 18.8% of the participants had been subjected to intensive treatment from SL products' side effects, and 81.2% had not. The result is illustrated in Table 3.

About 47.2% of the participants spent between 700-5000 Yemeni Rials on SL products and the rest of the females spent between 5000- 20000 Yemeni Rials. The amount spent to buy these products in a poor country indicates females' obsession with beauty and getting light skin. The most used products with their content are listed in Table 4.

Around 43% of the females were not sure about the contents of the SL products they were using. About 31.2% used vitamin A, 26.6% used vitamin C, 20.1% used Tretinoin, and 11.7% used HQ. The percentage of the other active ingredients that females used is illustrated in Table 5. The results are different from a study in Saudi Arabia where more than 47% selected corticosteroids, and 38.2% of the respondents selected mercury. A study in Sudan revealed that more than 80% of the population used HQ and/or CP or unlabeled mixtures of several whitening products bought from street vendors [20].

*[insert Table 3 here]*

**Table 3.** Practices of women using SL products for the skin

<b>Variables</b>	<b>n=154 (%)</b>
<b>Who advised you to use SL products?</b>	
Husband	7 (4.5)
Sister	20 (13.0)
Friend	100 (64.9)
A Member of the family	4 (2.6)
Advertising	3 (1.9)
Nobody	20 (13.0)
<b>Do you currently use SL products?</b>	
Yes	81 (52.6)
No	73 (47.4)
<b>Type of SL products in use?</b>	
Injection	2 (1.3)
Creams	129 (83.2)
Soap	23 (14.9)
<b>How long have you been using SL products?</b>	
1-5 Year	129 (83.8)
6-10 Year	25 (16.2)
<b>Where do you purchase SL product(s) from?</b>	
Cosmetics store	24 (15.6)
Pharmacy	127(82.5)
Supermarket	3 (1.9)
<b>Why did you use the skin-lightening product(s)?</b>	
The skin has a pigmentation disorder (eg, melasma, other skin problems)	36 (23.4)
To get a Light skin tone	83 (53.9)
Both of above	35 (22.7)
<b>What kind of product is used?</b>	
Exported products	93 (60.4)
Extemporaneously prepared product*	61 (39.6)
<b>How many SL products have been used?</b>	
One product	77 (50.0)
2-5 products	77 (50.0)
<b>Use during pregnancy?</b>	
Yes	14 (9.1)
No	140 (90.9)
<b>Use while breastfeeding?</b>	
Yes	18 (11.7)

No	136 (88.3)
<b>Fast whitening?</b>	
Yes	89 (57.8)
No	65(42.2)
<b>Are you satisfied with the result of the product?</b>	
Yes	106 (68.8)
No	48 (31.2)
<b>How many times are you using SL products?</b>	
Once/day	98 (63.6)
More than once/a day	33 (21.4)
2-3 times/week	23 (14.9)
<b>Where have you used SL products?</b>	
Face is only	54 (35.1)
Face and some other parts of the body	77 (50.0)
Almost the entire body (including the face)	22 (14.3)
<b>Is it difficult to stop using skin-lightening products?</b>	
Difficult	15 ( 9.7)
Somewhat difficult	30 (19.5)
Neutral	31 (20.1)
Somewhat easy	46 (29.9)
Very easy	32 (20.8)
<b>Who talked to you about stopping using SL products?</b>	
Physician or pharmacists	53 (34.4)
Friend	34 (22.1)
Family member	67 (43.5)
<b>Have you been subjected to intensive treatment for the SL product's side-effect?</b>	
Yes	29 (18.8)
No	125 (81.2)

\* Unknown active ingredient(s) (not declared on container or leaflet),

*[insert Table 4 here]*

**Table 4.** The name and contents of the most used SL products

<b>Products Name</b>	<b>n=154 (%)</b>	<b>Contents</b>
Glute Soap <sup>®</sup>	3 (1.9)	Glutathione, Vitamin B3, Vitamin B5
Whiting mixture	46 (29.9)	Locally mixed
Al-Samer Cream <sup>®</sup>	16 (10.3)	No Label
Clobetasol Cream <sup>®</sup>	9 (5.8)	CP 0.05%
Carotone Cream <sup>®</sup>	15 (9.7)	Water (aqua), mineral oil, petrolatum (paraffin), lanolin, stearic acid, cetyl-stearyl alcohol, isopropyl myristate, BHT, methylparaben, propylparaben, sodium lauryl sulfate, sodium sulfate, citric acid, glycerin, tocopheryl acetate (Vit. E), Acid Kojic, collagen, carrot oil, fragrance
Al-Qashat Cream <sup>®</sup>	3 (1.9)	Arbutin, vitamin (C), licorice, ginseng, herbal materials
Lloieal-Day & night Cream <sup>®</sup>	4 (2.6)	Vitamin C Lemon
Al-Arayas Cream <sup>®</sup>	4 (2.6)	Milk, turmeric, vitamin (C), Chamomile herbs
Glute Cream <sup>®</sup>	1 (0.6)	Glutathione, Vitamin B3, Vitamin B5
Clarilit Soap & Cream <sup>®</sup>	1 (0.6)	HQ, Tretinon, Mometasone Furoate Cream
Fair & Lovely cream <sup>®</sup>	4 (2.6)	Aqua (Water), Stearic Acid, Niacinamide, Glycerin, Isopropyl Myristate, Ethyl hexyl Methoxy Inanimate, Titanium Dioxide Cetyl Alcohol, Potassium Hydroxide Dimethicone, Butyl Methoxy dibenzoxyl Methane, Parfum, France Sodium Ascorbyl Phosphate, Tocopheryl Acetate
Spotless Cream <sup>®</sup>	10 (6.5)	Aqua, Propylene glycol, Cetearyl Alcohol, Glycerine, Caprylic/Capric Triglyceride, Cyclopentasiloxane, Dicaprylyl Carbonate, Glyceryl Stearate, Titanium Dioxide, Niacinamide, Salicylic Acid, Dimethicone, PEG-100 Stearate, Butyrospermum Parkii (Shea) Butter, Carbomer, Hexylresorcinol,

		Potassium Cetyl Phosphate, Phenoxyethanol, Parfum/Fragrance, Diazolidinyl Urea, Sodium Hydroxide, Xanthan Gum, Polyacrylamide, Disodium EDTA, Hydrolyzed Milk Protein, Butylene Glycol, C1314- Isoparaffin, Methylparaben, Lactose, Citric Acid, Laureth-7, Citrus Limon (Lemon) Fruit Extract, Propylparaben, BHA, Linalool, Hydroxycitronellal, Hexyl Cinnamal, Citronellol, Alpha-Isomethyl Ionone, Geraniol, Coumarin, Silver Citrate, Limonene
Johnson Soap <sup>®</sup>	1 (0.6)	Sodium Palmate, Sodium Palm Kernelate, Aqua, Glycerin, Palm Kernel Acid, Sodium Chloride, Tetrasodium EDTA, Tetrasodium Etidronate, Disodium Edta, Parfum
Avalon Cream <sup>®</sup>	2 (1.3)	HQ 1.9%
Spotless Soap <sup>®</sup>	2 (1.3)	Sodium palmate. Sodium palm kernelate. Aqua ( Water ) perfume Sodium chloride, Titanium Dioxide ( C1 NO 77891) Tetrasodium EDTA, Tetrasodium Etidronate, Niacinamide ( C1 NO 11680, C1No 12490, C1 No 77260
Tri-Derma Cream <sup>®</sup>	1 (0.6)	HQ 4%, Tretinoin 0.05%, Fluocinolone Acetonide 0.01%
Mixture of Soaps with Vit E <sup>®</sup>	2 (1.3)	No Lable
Vit C & Vit E Soap <sup>®</sup>	2 (1.3)	Vit C & Vit E
Melamet Cream <sup>®</sup>	3 (1.9)	HQ, Tretinon, Mometasone Furoate Cream
Bahamish Cream <sup>®</sup>	3 (1.9)	No Label
Abeer Cream <sup>®</sup>	1 (0.6)	No Label
Acetin Cream <sup>®</sup>	6 (3.9)	Tretinoin
Lemonvate Cream <sup>®</sup>	1 (0.6)	CP
Lit Up Cream <sup>®</sup>	1 (0.6)	Vitamin C, Licorice Extract, Salicylic Acid, Glycerin, Zinc Oxide, Mild Soap Base, Titanium Dioxide, Wheat Cream Oil
Azeric Soap <sup>®</sup>	1 (0.6)	Azelaic Acid, Wheat Germ Oil
Ultra-Lightening Cream <sup>®</sup>	2 (1.2)	Licorice Extract, Vitamin C Kojic Acid, Jojoba Extract Vitamin E, HQ, Titanium Dioxide, Zinc Oxide Benzophenone, Lactic Acid, Rose Oil, Watermelon Seed Extract, Grape Seed Extract.

The Ordinary Cream <sup>®</sup>	1 (0.6)	11 Amino Acids, Phospholipids, Alpha/Beta/Gamma Fatty Acids, Triglycerides, Sterols & Sterol Esters, Glycerin, Ceramide Precursors, Urea, Saccharides, Sodium PCA, And Hyaluronic Acid
Lina Shop Cream <sup>®</sup>	1 (0.6)	No Label
Tretinoin Cream <sup>®</sup>	1 (0.6)	Tretinoin
Lit Up Soap <sup>®</sup>	1 (0.6)	Vitamin C, Liquorice Extract, Salicylic Acid, Glycerin, Zinc Oxide, Mild Soap Base, Titanium Dioxide, Wheat Cream Oil
Hi Quin Cream <sup>®</sup>	1 (0.6)	HQ
Tea Tree Cream <sup>®</sup>	1 (0.6)	Tea Tree Oil
Turmeric Soap <sup>®</sup>	2 (1.3)	Turmeric
Diana Cream <sup>®</sup>	1 (0.6)	No Label
Charcol Cream <sup>®</sup>	1 (0.6)	Lumiskin , Polyphenolic

*[insert Table 5 here]*

**Table 5.** The main active ingredients used as SL products

Main skin-lightening ingredient(s)	n=154 (%)
HQ	18 (11.7)
Calomel and ammoniated mercury chloride	7 (4.5)
Tretinoin	31 (20.1)
Vitamin A	48 (31.2)
Clobetasol	31 (20.1)
Betamethasone	14 (9.1)
Aleosin	8 (5.2)
Vitamin C (ascorbic acid)	41 (26.6)
Alpha-hydroxy acids	7 (4.5)
Sunscreen (name not specified)	9 (5.8)
Not sure	67 (43.5)

### 3.4 Reported Side-Effects of the Use of SL Products

The most reported side effects of using SL products were acne vulgaris (44.2%) followed by pigmentation (26.0%), skin atrophy (22.1%), and the appearance of lines on the skin (striae) (20.1%), the other side effects percentage is illustrated in Table 6. Only 17.5% of the participants declared that they had not suffered from any side effects. The result is similar in side effects and slightly differs in percentage from the reported side-effect from a study in Nigeria where steroid-induced acne (45.3%), macular hyperpigmentation of the face (37.2%), mycoses (40.4%), striae (28.3%), telangiectasis (21.3%), hypertrichosis (13.9%) and diabetes mellitus (2.1%) [17]. Another study in Senegal reported that the main skin complaints in bleaching products users included dermatophyte infections (28.5%) and scabies (18.8%), both often unusually extensive and severe; acne (11.41%), often severe; eczema (11.14%); irritant dermatitis (3.80); and dyschromia (7.06%, including 3.80 cases of exogenous ochronosis). The skin examination noted features disregarded by users: striae (noticed in 39% of users), and macular hyperchromia involving the face, mainly the periocular area (33%) [18]. A study in Borama, Somaliland, revealed that 9% denied any undesirable adverse effects, and the remainder reported an array of local and systemic adverse effects. The vast majority realize that SL products may cause undesirable local (92%) and systemic (89%) adverse effects [21]. Acne, inflammation, ochronosis, hyperpigmentation, and bacterial and fungal infections were the most reported side effects due to the use of SL products in Sudan [20]. Another study in Sudan showed that the majority of side effects were skin redness (33.3%) and acne (27.0%) [22].

*[insert Table 6 here]*

**Table 6.** Reported side effects from the use of SL products

Side effect	n= 154 (%)
Skin atrophy	34 (22.1)
Acne vulgaris	68 (44.2)
Pigmentation	40 (26.0)
Peripheral neuropathy	3 (1.9)
Flushing, redness of the skin	67 (43.5)
Mental problems	0
The appearance of lines on the skin (striae)	32 (20.1)
Excessive weight gain	1 (0.6)
Erythroderma	2 (1.3)
Kidney damage	1 (0.6)
Unable to cook due to skin irritation	26 (16.9)
Telangiectasias	16 (10.4)
Impaired wound healing	4 (2.6)
Allergic contact dermatitis	18 (11.7)
Hypopigmentation	6 (3.9)
High blood pressure	4 (2.6)
Hypertrichosis	8 (5.2)
No-side effect	27 (17.5)

### 3.5 Limitations of the study

- 1- Limitations of our work include using a convenience sample, which might not represent the whole community; however, a strength of the work is collecting information from community pharmacists from which many patients may come to get advice without going to the clinics.
- 2- Relatively low sample size in the cross-sectional study.

### 3.6 Study recommendations

Finally, the following points are recommended to be of attention:

- 1- Collecting data to study the related side-effects of using SL products should be carried out periodically. As well as, a retrospective cross-sectional study to analyze the most common side-effects of using these products should be performed for a longer period that extended for several years. We need to get a clearer relationship between using these products with the prevalence of some skin diseases in the city.
- 2- Increase the awareness, and knowledge of females and even males about the health risks of continuous use without medical supervision.
- 3- Health education programs should target women through various media options, including leaflets, television, and radio. Education of the public on the risks of bleaching product use is imperative and would mitigate the side-effects of their use.
- 4- The sales and marketing of SL products must be controlled, which could be done by imposing fines and penalties on the marketers of such products.
- 5- This is quite worrisome, and the challenges require key health policymakers and officials to prevent dispensing these medicines without a prescription.

#### **4. CONCLUSIONS**

In summary, this study indicated that a proportion of respondents had overused and/or misused bleaching agents. This was regardless of age, income, education, or marital status. Therefore, there is a need to educate women about the possible risks.

Moreover, the results of this survey revealed that topical bleaching agents are very common among females in this city. The most-reported side-effects of using SL product were acne vulgaris followed by pigmentation, skin atrophy, and the appearance of lines on the skin (striae). Such side effects make it challenging for customers to stop using the product since they find it challenging to manage the symptoms. This conundrum emphasizes the importance of

informing the public to try to find medical care rather than continuing the bleaching practice. The SL products used were obtained from pharmacies, cosmetic shops and herbal markets. So, it further highlights the importance of managing the problem of getting these products without a medical prescription. Continuous use of these products without control will lead to complicated side effects on the skin and overall body systems.

UNDER PEER REVIEW

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