

# Use of Skin-Whitening Products by Sudanese Undergraduate Females: a Survey

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## Abstract

**Background** Although skin-whitening products are commonly used among dark-skinned women of African descent, research on the frequency with which Sudanese women use skin-whitening products is lacking.

**Methods** A cross-sectional study was conducted at the University of Gezira, Sudan, on the use of skin-whitening products among a sample of Sudanese undergraduate females (ages 16–33 years). Sociodemographic characteristics were collected, and students were asked whether they had used skin-whitening products in the past 12 months.

**Results** Of the 348 undergraduate females surveyed in this study, 74.4 % reported using skin-whitening products within the past year. Of this group, 2.7 % reported using injections, 2.4 % pills, 30.6 % bleaching cream, and 76.2 % soap. Illegal sources (e.g., people selling on the sides of roads) of skin-whitening products were reported by 22.8 %. The use of skin-whitening products was common in females who were not satisfied with their skin colors more so than those who were satisfied with their skin colors (83.7 vs. 70.5 %,  $P = 0.010$ ). Undergraduate females who had mothers, sisters, or other relatives who bleached reported a greater frequency of using skin-whitening products than those who had no family member who bleached (100, 87.7, or 77 % vs. 67.5 %,

$P = 0.003$ , respectively). The odds of using skin-whitening products in females who had mothers or sisters bleaching were 7.8 times higher (adjusted odds ratio (aOR) 7.8; 95 % confidence interval (CI) 2.572, 23.828) and two times higher in females who had other relatives bleaching (aOR 2.4; 95 % CI 1.159, 5.115), compared with females who had no family members who bleached.

**Conclusion** It was estimated that a majority (7 out of 10) of Sudanese undergraduate females have tried skin-whitening products. However, because the university population is an elite group, a population-based survey is warranted to address the use of skin-whitening products among the general population of Sudanese women.

**Keywords** Skin-whitening · Skin-bleaching · Sudan · Undergrads · Dark-skinned · Hydroquinone

## Abbreviations

aOR	Adjusted odds ratio
CI	Confidence intervals
SPSS®	IBM Statistical Package for Social Sciences version 23 (Chicago, Illinois, USA)
$P$	$P$ value

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## Introduction

The use of skin-whitening products appears to be a common phenomenon in many parts of the world, especially among dark-skinned women of African descent [1–4]. Several studies have been conducted in sub-Saharan Africa to determine the prevalence of the use of skin-whitening products. According to a study conducted in Senegal, 26 % of Senegalese women reported using skin-whitening products at the time of the study

and 36 % reported that they had used skin-whitening products previously [5]. Among the Senegalese women who reported using skin-whitening products, 75 % of them had experienced adverse skin effects [5]. Another study in Senegal reported 62.7 % of Senegalese women used skin-whitening products [6].

A study conducted in Bamako to estimate the prevalence of skin-whitening products in a sample of Mali women aged from 15 to 45 years revealed 25 % of their study sample used at least one bleaching agent [3]. Adebajo et al. investigated the use of skin-lightening cosmetics among both men and women in Lagos, Nigeria. According to the author, the prevalence of the use of skin-lightening cosmetics in females was 77.3 % [7]. A study conducted in a sample of 385 University of Benin undergraduates found 64.9 % of the students used skin-lightening agents with 70.7 % being females and 52.2 % being males [8].

As in many African countries, Sudanese women face pressure to lighten their skin due to the widespread social perception that light skin is considered more attractive, beautiful, and reflective of high social status [5]. This social perception has led to a significant increase in the use of skin-whitening products in Sudan. In the last two decades, large numbers of Sudanese women pay great attention to skin-whitening products such as pills, injections, creams, soaps, and natural skin-bleaching recipes. These products contain chemicals, mercury materials, cortisone, hydroquinone, and more, and are known to be so dangerous to the health of its users that they are directly associated with adverse health and skin effects [2–4]. Although the Sudanese government has banned the use of 13 skin-whitening products, these products are available in various stores and by other methods on a large scale, and without censorship. Buying, selling, and advertisements of these products can be seen on the sides of roads, in non-compliance with government specifications.

Research reveals that several chemicals and toxic compounds used in the preparation of whitening products can have harmful effects [9]. Skin-whitening products contain high levels of mercury, which could lead to kidney damage, liver failure, skin rashes, discoloration, anxiety, depression, and severe disorders of the nervous system [9–12]. Several studies have shown that the substance hydroquinone is used in whitening products to inhibit melanin production [13–16]. Hydroquinone, when used improperly, can cause irritation of the skin as well as skin pigmentation, joint arthropathy, and headaches [13–16]. A clinical trial that compared a skin-whitening complex using hydroquinone versus a placebo in the treatment of melasma reported that the side effects were greater in patients receiving hydroquinone (4 %) [17]. It is worth noting that the current political culture in Sudan opposes diversity and opposes the African identity. In Sudan, skin-whitening products are accessible without a doctor's prescription and are frequently sold on the sides of roads. While women of color tend to lighten their skin for several reasons, the reasons Sudanese women lighten their skin remain unaddressed. However, previous international studies conducted in various

countries recognize psychological issues—such as a lack of self-confidence, social pressure, and low self-esteem—are the primary reasons for using skin-whitening products [18–21].

There is little data that addresses the use of skin-whitening products among Sudanese women. One exception is the work of Abubakr K. Yousif et al. who, during their research, examined the use of bleaching creams containing corticosteroids, hydroquinone, and mercury for skin lightening among higher secondary school students (16–19 years) in central Sudan. Fully 55.4 % of the higher secondary school students misused these products, while 51.6 % of the higher secondary school students used cosmetics to lighten their skin [22]. Recently, another study conducted in Khartoum, Sudan, on 69 women revealed that 78.3 % of women aged between 20 and 29 years used cosmetics containing hydroquinone [23]. According to the authors, the data showed that 65.2 % of these women used cosmetics containing hydroquinone for skin lightening [24].

To date, there have been no formal studies conducted in adult Sudanese women investigating the risk factors associated with the use of skin-whitening products. We sought to determine the prevalence of the use of skin-whitening products among Sudanese undergraduate females. We also aimed to study the contribution of risk factors for the use of skin-whitening products among these same females.

## Methods

A cross-sectional study was conducted on the use of skin-whitening products among a sample of Sudanese undergraduate females (ages 16–33) attending lectures between July and September 2015. The study was conducted at the University of Gezira, which is one of the largest public universities in Sudan. The study received ethical approval from the Research Committee in the Department of Applied Statistics and Demography at the Faculty of Economics and Rural Development. Although the study was based on an anonymous self-administered survey, students were asked if they agreed to participate in the study, complete the questionnaire, and return it. Students were chosen randomly. A total of 1500 female students were each assigned a number. Excel was used to generate random numbers ( $n = 400$ ) between 1 and 1500 without replacement. A total of 400 questionnaires were distributed to those who were randomly selected and 348 questionnaires were completed and returned with a response rate of 87 %. We collected the sociodemographic characteristics of each student. The following data were collected: university level, employment status, marital status, place of residence, living on-campus, obesity, skin color, satisfaction with skin color, types of skin, and if family members bleached. Students were asked whether they had used skin-whitening products in the past 12 months. If they answered yes, we asked questions related to the type of skin-whitening products used.

The questionnaire also included the source of skin-whitening products, how they learned about the skin-whitening products, and whether a family member used skin-whitening products.

### Statistical Analyses

Demographics of the undergraduate females were presented in the form of percentages (Table 1). The use of skin-whitening products among undergraduate females was summarized by prevalence and a 95 % CI. The prevalence of skin-whitening products use was analyzed by the demographics of the undergraduate females (Table 1). The characteristics of those who used skin-whitening products were summarized in Table 2.

A multivariate binary logistic regression model was used to identify determinants of skin-whitening product use (Table 3). We selected variables for inclusion in the full logistic regression model using the backward method based on the likelihood of ratio statistic ( $P \leq 0.10$ ). Data analyses were performed using IBM Statistical Package for Social Sciences (SPSS®) version 23.

### Results

A sample of 348 undergraduate females was included in the analysis. The average age of the sample was  $20.8 \pm 1.9$  years. Of the females, 26.1 % were freshmen, 33.5 % were

**Table 1** The prevalence of use of skin-whitening products and the sample characteristics ( $N = 348$ )

		Overall $N = 348$		Yes 259 (74.4 %)		No 89 (25.6 %)		$P^e$
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
University level <sup>a</sup>	Freshman	95	26.1	75	80.6	18	19.4	0.008*
	Sophomore	122	33.5	80	69.6	35	30.4	
	Junior	87	23.9	55	65.5	29	34.5	
	Senior	60	16.5	49	87.5	7	12.5	
Are you employed?	Yes	45	12.4	36	81.8	8	18.2	0.229
	No	319	87.6	223	73.4	81	26.6	
Married <sup>b</sup>	Yes	51	14.0	44	86.3	7	13.7	0.036*
	No	313	86.0	215	72.4	82	27.6	
Place of residence	Urban	188	51.6	129	72.9	48	27.1	0.502
	Rural	176	48.4	130	76.0	41	24.0	
Living on-campus	Off-campus	167	45.9	112	71.3	45	28.7	0.231
	On-campus	197	54.1	147	77.0	44	23.0	
Obese	Yes	20	6.6	16	80.0	4	20.0	0.569
	No	281	93.4	202	74.3	70	25.7	
Skin color	Dark	171	47.1	125	76.2	39	23.8	0.682
	Light	134	36.9	96	73.8	34	26.2	
	White	58	16.0	38	70.4	16	29.6	
Are you satisfied with your skin color? <sup>c</sup>	Yes	260	71.4	172	70.5	72	29.5	0.010*
	No	104	28.6	87	83.7	17	16.3	
Types of skin	Dry skin	130	35.7	93	75.0	31	25.0	0.958
	Oily skin	152	41.8	106	73.6	38	26.4	
	Combination skin	82	22.5	60	75.0	20	25.0	
Do any family members bleach?	Yes	122	36.7	93	78.8	25	21.2	0.299
	No	210	63.3	151	73.7	54	26.3	
Family member who bleached <sup>d</sup>	Mother	9	2.7	9	100.0	0	0.0	0.003*
	Sister	66	19.5	57	87.7	8	12.3	
	Other relative	87	25.7	67	77.0	20	23.0	
	None	177	52.2	114	67.5	55	32.5	

The use of skin-whitening products was common in <sup>a</sup> freshmen or seniors (80.6 % freshmen, 69.6 % sophomores, 65.5 % juniors, 87.5 % seniors), <sup>b</sup> married students (86.3 % vs. 72.4 %), <sup>c</sup> females who were not satisfied with their skin colors (83.7 % vs. 70.5 %), <sup>d</sup> females whose mothers, sisters, or other relatives bleached (100 %, 87.7 %, or 77 % vs. 67.5 %, respectively). <sup>e</sup>  $P = p$ -values were calculated by Chi-square tests

**Table 2** The characteristics of females who used skin-whitening products ( $N = 259$ )

	<i>n</i>	%
Type of skin-whitening products		
Injections	8	2.7
Pills	7	2.4
Bleaching cream	90	30.6
Soap	224	76.2
Natural skin-bleaching recipes, e.g., lemons	183	62.2
Source of skin-whitening products		
Doctor/dermatology clinic	85	28.9
Certified pharmacy	117	39.8
Illegal source	67	22.8
I make my own bleaching recipes at home	141	48.0
Learned about skin-whitening products		
Television advertisement	85	28.9
Newspaper advertisement	35	11.9
Recommended by a friend	139	47.3

sophomores, 23.9 % were juniors, and 16.5 % were seniors. Among the females studied, 12.4 % were employed and 14 % were married. More than half of the students were on-campus residents. Among the 348 students, 47.1 % described their skin color as dark, 36.9 % reported light skin, and 16 % reported white skin, and 28.6 % reported that they were not satisfied with their skin color. The majority (41.8 %) had oily skin, 35.7 % had dry skin, 22.5 % had combination skin, and 36.7 % had at least one family member that bleached. Refer to Table 1 for other sample characteristics.

The prevalence of the use of skin-whitening products in our sample was 74.4 % (294/348) with 95 % CIs of (69.50–78.93 %). Among the 294 females who reported using skin-

whitening products (Table 2), 2.7 % reported using injections, 2.4 % pills, 30.6 % bleaching cream, and 76.2 % soap. In our sample, 62.2 % used natural skin-bleaching recipes. The sources of skin-whitening products were reported as follows: 28.9 % came from dermatology clinics, 39.8 % from a certified pharmacy, 22.8 % from illegal sources, and 48 % reported making their own bleaching recipes at home. In terms of how they learned about skin-whitening products, 28.9 % learned through TV advertisements, 11.9 % through newspaper advertisements, and 47.3 % through friends.

The prevalence of use of skin-whitening products and their relation to the sample characteristics are shown in Table 1. College women who were freshmen or seniors were more likely to use skin-whitening products than sophomores or juniors (80.6 % freshmen, 69.6 % sophomores, 65.5 % juniors, 87.5 % seniors,  $P = 0.008$ ). A higher prevalence of use of skin-whitening products was found among married students than unmarried students (86.3 vs. 72.4 %,  $P = 0.036$ ). The use of skin-whitening products was common in females who were not satisfied with their skin colors as opposed to the females who were satisfied with their skin colors (83.7 vs. 70.5 %,  $P = 0.010$ ). Females whose mothers, sisters, or other relatives bleached reported a greater frequency of use of skin-whitening products than girls who had no family member bleaching (100, 87.7, or 77 % vs. 67.5 %,  $P = 0.003$ , respectively) (Fig. 1). The use of skin-whitening products was slightly increased among females who reported having dark skin as compared to females who reported light skin or white skin (76.2 vs. 73.8 and 70.4 %,  $P = 0.958$ ); however, these differences were not significant. The prevalence rates of use of skin-whitening products were comparable in terms of employment status, marital status, obesity, place of residence, and types of skin ( $P > 0.05$ ).

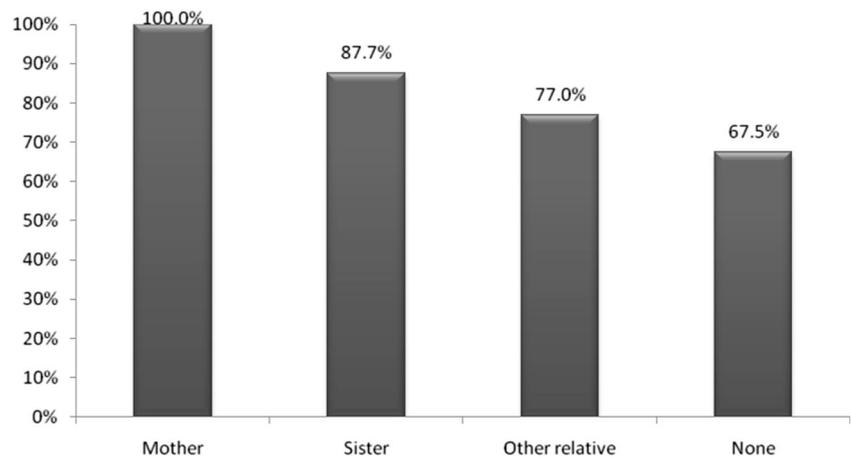
Binary logistic regression with the backward method identified two risk factors that tend to increase the risk of the use of

**Table 3** The risk factors associated with the use of skin-whitening products

Factor	Reference	B	SE	Wald	<i>P</i>	OR	95 % CI for OR	
							Lower	Upper
Freshman	Senior	-0.12	0.57	0.04	0.833	0.9	0.289	2.719
Sophomore	Senior	-1.32	0.53	6.12	0.013*	0.3	0.094	0.761
Junior	Senior	-0.94	0.54	2.99	0.084*	0.4	0.135	1.133
Employed	Unemployed	1.02	0.58	3.09	0.079*	2.8	0.890	8.609
Married	Unmarried	1.02	0.50	4.07	0.044*	2.8	1.029	7.436
Obese	Non-obese	1.51	0.81	3.48	0.062*	4.5	0.926	22.158
Family member who bleached								
Mother/sister	None	2.06	0.57	13.13	0.001*	7.8	2.572	23.828
Other relative	None	0.89	0.38	5.52	0.019*	2.4	1.159	5.115
Constant		1.07	0.47	5.18	0.023	2.9		

\*Wald chi-square is significant at  $\alpha = 0.10$

**Fig. 1** Prevalence of use of skin-whitening products when a family member bleaches



skin-whitening products (Table 3). According to the backward method based on the likelihood ratio statistic, females who had mothers or sisters bleaching were approximately eight times more likely to use skin-whitening products than females who had no family member bleach (aOR 7.8; 95 % CI 2.572, 23.828). Females who had other relatives bleach were two times more likely to use skin-whitening products compared with females who had no family member bleach (aOR 2.4; 95 % CI 1.159, 5.115). The odds of using skin-whitening products were 70 % less in sophomore students than in senior students (aOR 0.3; 95 % CI 0.094, 0.761) and 60 % less in junior students than in senior students (aOR 0.4; 95 % CI 0.135, 1.133). The odds of using skin-whitening products were approximately three times higher in married students than in unmarried students (aOR 2.8; 95 % CI 1.029, 7.436). The use of skin-whitening products was 4.5 higher in obese students than non-obese students (aOR 4.5; 95 % CI 0.926, 22.158).

## Discussion

The study tended to identify the prevalence of the use of skin-whitening products among a sample of undergraduate females in Sudan. No related data on skin-whitening among undergraduate females in Sudan were found, to the best of our knowledge. A high prevalence of skin-whitening product use was reported in our sample (74.4 %), which is considered consistent with previous findings from Sudan [24, 25]. Recently, a study conducted in Sudan reported (78.3 %) of young women aged between 20 and 29 years used cosmetics containing hydroquinone [24]. Adebajo et al. found that the use of skin-lightening cosmetics in female traders in Lagos, Nigeria, was at 72.4 % [8]. In a study conducted in Durban, South Africa, Dlova et al. found that the use of skin-lightening products in African women was 60 % [26]. This figure was less than our findings, probably due to their range of ages (18–70 years), as well as the setting of their study in two large

public hospitals in Durban. Our findings were also similar to the Benin figure, 70.7 % of the female students reported using skin-lightening agents [9]. Mahéa et al. reported use of skin-lightening products on 99 pregnant women. Sixty-nine percent of the pregnant women reported using skin-whitening products during their current pregnancy [27].

Limited data was available from Sudan. The use of skin-whitening products is common among higher secondary school students in Sudan [24], and 55.4 % of the higher secondary school students misused bleaching creams for skin lightening, while 51.6 % of higher secondary school students reported using cosmetics to lighten their skin [24]. However, these figures were small because they were based on whether participants of the study used bleaching creams containing corticosteroids, hydroquinone, and mercury. Higher secondary school students may not know whether the products they used contain chemicals and other toxic materials. Our investigation revealed that the odds of using skin-whitening products were significantly more common in students who had a mother or sister who bleaches (aOR = 7.8), as was true of students who had other relatives using bleaches (aOR = 2.4), when compared to students who had no family member bleaching. The results also show that a number of other risk factors may contribute to the use of skin-whitening products, among them being married, obese, a sophomore, and employed. Our findings suggest the need for widespread awareness among undergraduate girls in Sudan regarding the health risk and consequences of using skin-whitening products. The current investigation could serve as a resource for dermatologists around the world who may have patients seeking dermatological treatment due to using harmful skin-whitening products. The main factors leading to widespread use of skin-whitening products remain unknown. The role of the Sudanese government regarding reducing skin-whitening products should be investigated in future research. Specifically, several modifiable factors may reduce skin-whitening products, such as the available health system, educational programs, or public policies. For instance, data can be

collected about whether the women have received any information about the health outcomes of skin-whitening products. Interventional studies are needed to assess the effectiveness of sources of information (social media, TV, etc.) on reducing skin-lightening practices. These future studies may suggest that strong action is needed from the Sudanese government to apply educational programs, public policies, or intensive law-enforcement efforts to rid Sudan of the availability of dangerous chemicals or toxic skin-whitening products. Despite the fact that the Sudanese government issued a statement banning 13 skin-whitening products, toxic products as ingredients in skin whitening are accessible to everyone and are even sold on the sides of roads. Our proposed studies may also recommend updating the university curriculum to include courses or lessons to (1) raise awareness about the serious health consequences of using these products and (2) to increase self-esteem among young Sudanese women so that they can feel proud of their skin. Several limitations in our study were noted: the findings of this study must be interpreted with caution, as the sample of the study only represents the Sudanese undergraduate female population, which does not represent the entire female Sudanese population. The study was based on a cross-sectional and self-administered questionnaire, and findings may conclude associations but not causations.

## Conclusion

It was estimated that a majority of Sudanese undergraduate females have tried skin-whitening products, since 7 out of 10 females reported using skin-whitening products within the past year. This finding is consistent with other studies in sub-Saharan Africa. Our findings suggest the need for increasing the levels of awareness among young Sudanese women regarding the serious consequences of using skin-whitening products. The findings may also prove valuable to university and government policymakers in Sudan, as well as other states facing similar issues. A population-based survey is warranted to address the use of skin-whitening products among the majority of Sudanese women.

**Compliance with Ethical Standards** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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**Conflict of Interest** All authors declare that they have no competing interests.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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