



Use of Skin Bleaching Products in West Africa

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Authors' contributions

This work was carried out in collaboration among all authors. Authors AMA, OPO, AEA, HP, AU, GA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript and reviewed and made the necessary edits. Authors OA, GA, wrote the protocol, managed the analyses of the study and wrote the first draft of the manuscript. Authors ORU, Ayobami Adesuyi, AO, FB, Ayobami Adesuyi, FD, BK managed the literature searches, wrote the first and second draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background: The use of skin bleaching products is considered a common trend in dark-skinned women in West Africa, Surprisingly, only a few studies have been carried out on this subject in West Africa. The objectives of the study are to determine the prevalence, active component, complications, and mechanism of action of the key ingredients of skin bleaching products.

Methods: This review article was conducted by searching PubMed (MEDLINE) and EMBASE using the search terms “ Use of skin bleaching products” and “West Africa” with a focus on articles from 2002 to 2022. Certain criteria were used to include or exclude articles from our study.

Results: All articles reviewed revealed a rise in the prevalence of use of skin bleaching products ranging from 25% to 58.9% in women from Sub-Saharan Africa. The most common components found include hydroquinone, corticosteroids, mercury, and caustic agents. Some complications that result from the use of these products include skin atrophy, hyperpigmentation of skin around joints, Striae atrophicae, skin infection, and secondary adrenal insufficiency.

Conclusion: The rise in the prevalence of the use of skin bleaching products in West African women has resulted in a corresponding rise in detrimental health conditions. Hence, Educating people concerning the harmful effects of the components of skin-lightening products should be employed and the government should put policies in place to reduce or legally prohibit the use of these products as the harm inarguably outweighs any perceived benefit.

Keywords: Skin bleaching; skin bleaching products; West Africa; skin bleaching complications.

1. INTRODUCTION

Skin bleaching is a cosmetic procedure that lightens dark skin; it's done to attain a generally lighter skin color [1]. This procedure dates back to the times of the Greeks and Romans when the olive was used to lighten the skin. Modern-day skin bleaching which is especially common within the darker populations likely originates from the era when black people and people all over the world were enslaved and subject to discrimination [2] and having lighter skin meant that you had more favour, and less discrimination against you [3]. The prevalence of skin bleaching has been rising steadily, and currently, it is at an all-time high especially in West Africa [4].

Skin-lightening products exert their effect mainly by attacking the pigment-producing cells present within the skin, which are the melanocytes. By destroying the melanocytes within the skin, they reduce the amount of pigment being produced and ultimately lead to lighter skin color [1]. Some products used for skin bleaching are seen in body lotions and shower gels. They contain active ingredients like hydroquinone, mercury, and corticosteroids [5], which can be extremely harmful to the skin and the body in general.

There are numerous controversies surrounding the use and distribution of skin bleaching products, but for this study, we will be focusing on the West African population who use this product to lighten their skin. Despite the reports of both acute and chronic cutaneous and systemic complications due to the use of these

products, the prevalence of use of some of these products has been reported as high as 70% in some West African countries [6]. There have been multiple findings of dermatologic abnormalities associated with the use of these products, including skin ulcers, ochronosis (bluish-black discoloration on the skin), and dyschromia (change in the color of skin or nails) [5,7,8]. Unfortunately, there have also been reports of the development of chronic systemic diseases. A cross-sectional study conducted on women in Senegal, found the prevalence of diabetes and hypertension to be higher within the population that practiced skin lightening compared to those that don't [5].

Corticosteroids are also a major component in some of these products [5,7]. Due to the catabolic and immunosuppressive effect of corticosteroids, when these products are applied to the skin over an extended period, atrophy and the formation of striae on the skin occur [8]. Widespread skin infection could also occur, due to the suppression of the skin's immune system [5,8]. Abrupt cessation of creams that contain corticosteroids could also result in secondary adrenal insufficiency [1].

With the rising prevalence of skin bleaching in West Africa, there have just been a few works of literature written about this matter. This study was undertaken to bring more attention to the harm caused by skin bleaching and also assess the prevalence of use of these products among West Africans.

2. METHODOLOGY

We searched two major databases, PubMed (MEDLINE) on 31st May, 2022¹ and EMBASE on 1st June, 2022 using specified search terms. Search terms on Medline database and EMBASE are "Use of skin bleaching products" and "West Africa".

2.1 Inclusion Criteria

- 1) All articles written in English.

- 2) Articles related to the objectives of the study from the year 2002 to 2022

- 3) Original articles.

2.2 Exclusion Criteria

- 1) Review articles
- 2) Articles not written in English
- 3) Articles published before the year 2002

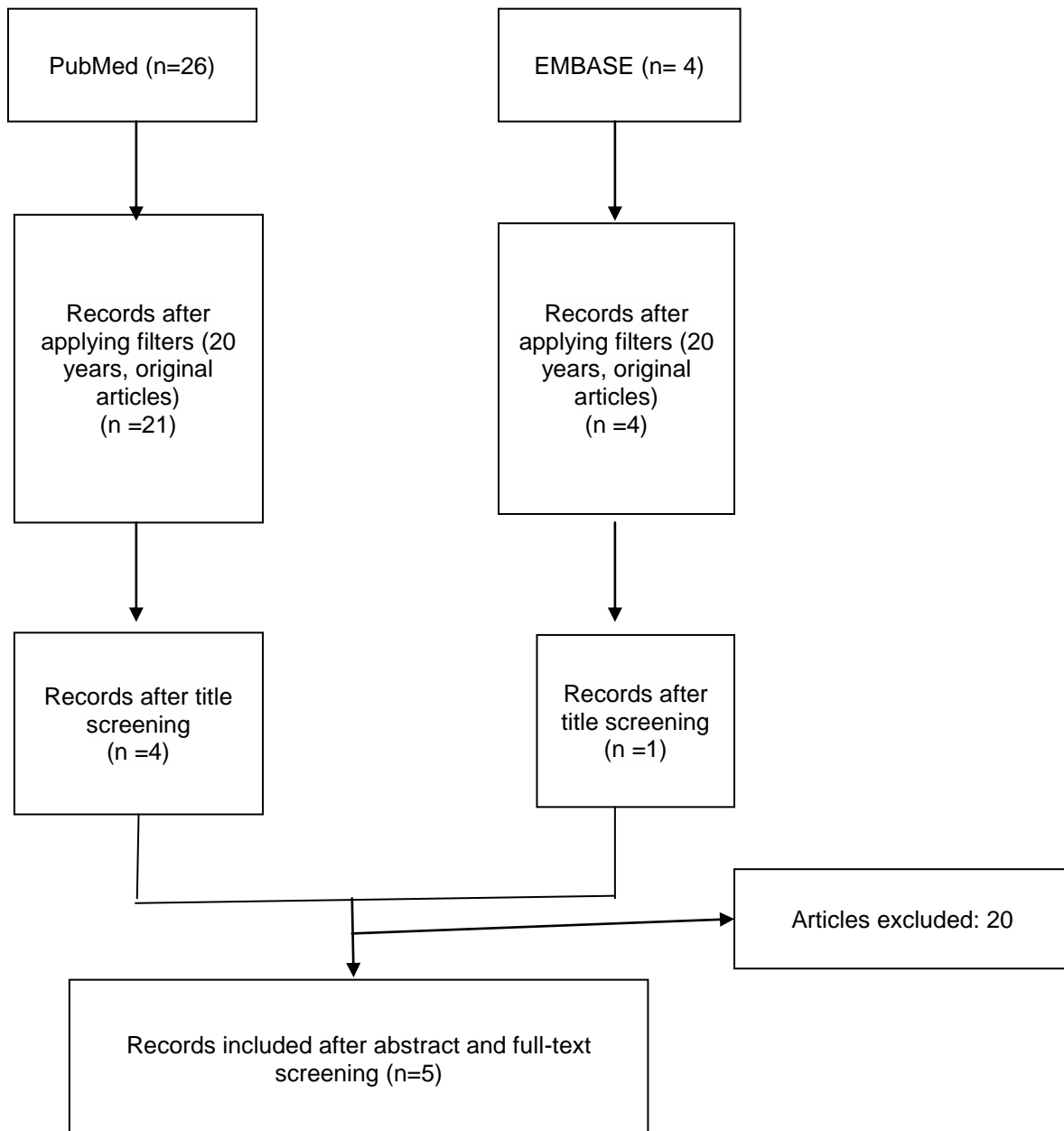


Fig. 1. A flow diagram summarizing the literature search used for this study

2.3 Data Collection and Study Assessment

Five authors (FO, UA, AO, OH, NC), independently reviewed the abstracts of all the articles identified. Articles adopted were based on the inclusion criteria (see Fig. 1). The adopted papers were screened, and a spreadsheet was created to include all the proposed articles. All authors were involved in the final selection process.

2.4 Data Synthesis

The data synthesis was done in a clear and detailed descriptive summary via tabulating. All the identified concepts and themes were arranged and grouped to synthesize significant themes. All authors were responsible for reviewing and discussing major identified themes in the study.

3. RESULTS

Out of the five eligible articles, four were cross-sectional studies [5,6,8,9] and one was a prospective descriptive study [10]. The Sample size ranges from 86 to 910 participants. Four studies were conducted only on the female population [6,8–10] while one study was carried out on both male and female populations [5]. The age of participant's ranges from 15 to 70 years and the study population varies from Ghana, Senegal, and Togo. Two out of the five articles discussed all four objectives [6,11], while the remaining articles discussed at least one of the four objectives that were outlined for our study (see Table 1).

The prevalence of the use of skin-lightening products was explored by all five studies, ranging from 25% to 58.9%. Skin lightening product was also more common in women than men. There is also a noted increase in the trend of the use of skin-lightening products amongst individuals. This rise in trend can be attributed to factors such as family and peer pressure influence [5].

A variety of products like hydroxyquinone, mercury, corticosteroids, and caustic agents are the major ingredients found in these skin lightening products. The mechanism of action by which these products cause skin depigmentation ranges from inhibition of melanin production (hydroxyquinone) to cutaneous blood vessel vasoconstriction (corticosteroids) [6].

4. DISCUSSION

4.1 The Prevalence of Skin Lightening Products Use in West Africa

The social practice involving the use of skin-lightening agents to enhance the beauty in different black communities around the world has been ongoing for a very long time [12]. However, there has been an increasing trend among adults, especially the female population in West Africa [13]. This practice has become a norm such that it is widely practiced transcending marital, socioeconomic, and even educational status [14]. Several studies done has shown a high prevalence in the Western Africa region, such as seen in places like Bamako (Mali) with 25% [15], Dakar (Senegal) with 52.7% [16], Ghana with 50.3% done on both male and female populations [5]. Another study in support of the high prevalence was one done among adolescents in senior high school in the Brong Ahafo region of Ghana with 65.6% admitting to skin lightening usage [6].

More recent studies have shown it is becoming an increasingly prevalent practice [17] among men even though previous studies done were mostly amongst the women population [15]. A cross-sectional study that assessed the products and their associated complication amongst women over 15 years in different parts of Lome showed 58.9% prevalence among a study population of 910 women. However, this study further illustrated that single women ($p < 0.005$), women less than 40 years ($p < 0.00007$), and educated women ($p < 0.005$) had a higher proportion of usage compared to their counterparts [9].

4.2 Key Ingredients of Skin Bleaching Products Used in West Africa

The skin bleaching product's active ingredients include mercury, corticosteroids, caustic agents, and hydroxyquinone and the concentrations have been found to exceed the recommended values [5,6,8,9,11]. Other constituents of some skin bleaching products are extracts from plants like lemon, carotene, and citric acid [10]. In two studies done in Senegal, it was found that hydroquinone and Topical corticosteroids were the most common component of skin bleaching products in Senegal [8,10]. Mahe et al reported a high composition of 89% hydroquinone and 70% topical corticosteroids [4] while Fatimata et al reported a composition of 56% hydroquinone and

Table 1. The Identified agents, prevalence, and complications of the skin lightening products of included studies

Author/Year	Study design	Study population/ Country	Prevalence	Identified agents	Complications
1. Lartey M et al, 2017	Cross-sectional study.	Adults/Ghana	50.3%	Hydroquinone Mercury Corticosteroids Caustic agents.	Hypopigmentation Ochronosis Striae Skin infections Acne Rosacea Easy skin bruising, Phototoxicity
2. Mahe A et al, 2003	Cross-sectional study	Adult women / Senegal.	52.7%	Hydroquinone (89%) Glucocorticoid (70%) Mercury (10%) Caustic agents (17%) Unknown composition (13%)	Dermatophyte infections Scabies Acne Eczema Irritant dermatitis, Ochronosis Dyschromia
3. Osei M et al 2017	Cross-sectional study	Female senior high school students/ Ghana.	Not stated	Hydroxyquinone Mercury Corticosteroids.	Ochronosis Kidney damage Skin atrophy
4. Pitché P et al, 2005	Cross-sectional study	Adult females/Togo	58.9%	Mercury (30.9%) Hydroquinone (24%) Topical Corticosteroids (18.5%)	Acne, cutaneous atrophy, Leukomelanoderma, Hypopigmentation, hyperpigmentation, hypertension Diabetes
5. Ly F et al, 2007	Prospective, descriptive study.	Adult females/Senegal	Not stated	Topical corticosteroids (78%) Hydroquinone (56%) Vegetable extracts (31.7%) Caustic products (8.5%) Products of unknown composition (41.4%).	Aesthetic complication - Hyperpigmentation of the joints (85.4%) - Striae atrophicae (72%) - skin Atrophy (59.8%)

The summary of included studies in terms of prevalence, agents used, and complications of skin lightening products

78% topical corticosteroids [10]. These findings are in contrast to that found in Togo by Pitche et al, where the most common constituents were Mercury(30.9%), followed by hydroquinone and Topical corticosteroids [9].

Studies were done in other West African countries like Ghana only stated the ingredients of these skin bleaching products [5,6].

4.3 The Mechanism of Action of Skin Lightening Products

Hydroxyquinone's mechanism of action is by inhibiting the production of melanin (a substance in the skin that causes pigmentation). Hence hydroxyquinone leaves the skin depigmented and can cause adverse effects like ochronosis (a bluish-black discoloration of the skin) [15,18]. Mercury causes skin lightening due to its salts inhibiting the production of melanin from the skin [19].

Another component of the skin lightening agent is corticosteroids which act by constricting the blood vessel under the skin hence leading to hypopigmentation. This can also make the skin to be fragile and can cause striae too [14,20]. Skin bleaching cosmetics, toiletries, and other depigmenting agents have been banned in the European Union and the United States as cosmetics, because of their mutagenic potential and undesirable dermatologic effects [21,22].

Topical corticosteroids are used as skin lighteners due to their potent bleaching action, and also their anti-inflammatory activity, which can reduce the risk of dermatitis when used along with other irritating skin lightening agents [23].

4.4 The Complications of Skin Lightening Products

The intention for skin bleaching is to lighten and tone the skin, however, it has been found that the side effects greatly outweigh the benefits for the users of these products. The practice of skin bleaching is marked by the development of majorly cutaneous complications as well as systemic complications resulting from prolonged exposure to the active ingredients in the products [16].

Though the effect of prolonged use might not be clearly delineated as many users combine two or more products to achieve their desired effects,

some complications can be linked to specific active agents via their mechanism of action and effects seen in its use for medical purposes.

These side effects can be discussed under these sub-headings: i. Topical complications ii. Systemic complications

4.4.1 Topical complications

There has been no satisfactory attempt to access all the dermatologic complications of skin bleaching as there is a wide variety of skin complications. These complications include leukomelanoderma, exogenous ochronosis, squamous cell carcinoma, dermatitis, fungal and bacterial infections, cataract, nail pigmentation, patchy pigmentation, elastosis, extensive striae, telangiectasia, body odor, candidiasis, scabies, eczema, acne, perioral dermatitis, irritant dermatitis, dyschromia, isolated itching, pigmented keratosis pilaris, striae, poikiloderma, tinea versicolor, blue ear, facial hypertrichosis [24–27].

4.4.1.1 Corticosteroids

Even though corticosteroids in combination with antifungals can be used as a treatment of certain skin conditions like seborrheic dermatitis, long term usage as seen in skin bleaching poses deleterious effects like severe widespread fungal, bacterial, or scabetic infections as a result of suppression of the skin immunity by prolonged corticosteroids. Clobetasol propionate is a potent corticosteroid that is found in most steroid-containing bleaching agents and is known to cause striae, skin fragility, and telangiectasis following prolonged use due to its atrophying effect on the skin [14,20].

The major side effect of corticosteroid use in skin bleaching is cutaneous atrophy which presents as skin fragility, telangiectasia, and striae [27].

4.4.1.2 Hydroquinone

Hydroquinone-containing products cause dyschromia with lichenoid or “lupus-like” features [10], exogenous ochronosis development [15,18] as well as being toxic to the fetus [28] while also increasing the risk of developing squamous cell carcinoma [15,18].

4.4.2 Systemic complications

It has been found from numerous studies that skin bleaching products cause various systemic

complications and not just dermatologic side effects. Some of the systemic complications include hypertension [22], diabetes [22], adrenal insufficiency [29], certain kidney problems like membranous nephropathy [22], nephrotic syndrome [30], poor sleep and loss of memory [31].

A cross-sectional study in a representative sample of Senegalese women found the prevalence of diabetes and hypertension to be higher in the population that practiced skin lightening compared with the control group (46.3 and 8.2% in the diabetics, versus 34.1 and 8.2%, respectively, in the hypertensive patients) [22]. It was also found that a patient who used clobetasol propionate inappropriately had lower levels of total cortisol metabolite than that of major androgen metabolite. These represented 3.2 and 23.4% of normal mean levels [29].

Absorption of mercury found in these products from the skin over time leads to increased blood levels of mercury which is dangerous to human health [30,31]. In a study by Barr et al, the use of mercury-containing skin lightening creams in the patients studied appeared to be associated with “minimal-change” renal glomerular lesions in half of the patients studied [30]. Studies done outside West Africa have shown other potential side effects that have not been explored by researchers in West Africa pertaining to skin bleaching products. These studies include a report of a high prevalence of sleeping difficulties (51%) and loss of memory (44%) [31], among users of cream called Mexican beauty creams in the United States and a study by Sin and Tsang reporting insomnia (9%) and memory loss (5%) in 314 interviewees using skin lightening products in Hong Kong [32].

4. CONCLUSION

There has been a steady increase in the prevalence of bleaching cream use among males and females. The prevalence is higher amongst females.

In conclusion, skin bleaching is detrimental to the body and general well-being. The use of these products should be avoided at all costs. With the upward trend in prevalence in a lot of Sub-Saharan African countries, perhaps educating the population, particularly adolescents can help curb the rise in this practice. The governments of these nations also have to crack down on the

distributors of these harmful products and ensure the safety of their populations.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Cosmetic procedures - Skin lightening - NHS [Internet]. [Cited 2022 Aug 9]. Available: <https://www.nhs.uk/conditions/cosmetic-procedures/skin-lightening/>
2. Colorism - NCCJ [Internet]. [Cited 2022 Aug 9]. Available: <https://www.nccj.org/COLORISM-0>
3. Hunter M. The persistent problem of colorism: Skin tone, status, and inequality. *Sociol Compass* [Internet]. 2007;1(1):237–54. [Cited 2022 Aug 10] Available: <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1751-9020.2007.00006.x>
4. Paying a high price for skin bleaching | Africa Renewal [Internet]. [Cited 2022 Aug 10]. Available: <https://www.un.org/africarenewal/magazine/april-2019-july-2019/paying-high-price-skin-bleaching>
5. Lartey M, Krampa FD, Abdul-Rahman M, Quarcoo NL, Yamson P, Hagan PG, et al. Use of skin-lightening products among selected urban communities in Accra, Ghana. *Int J Dermatol* [Internet]. 2017;56(1):32–9. [Cited 2022 Aug 9] Available: <https://pubmed.ncbi.nlm.nih.gov/27943305/>
6. Osei M, Ali M, Owusu A, Baiden F. Skin-lightening practices among female high

- school students in Ghana. *Public Health* [Internet]. 2018;155:81–7. [Cited 2022 Aug 9] Available: <https://pubmed.ncbi.nlm.nih.gov/29328977/>
7. Skin Bleaching Products and Procedures: Side Effects and Benefits [Internet]. [Cited 2022 Aug 9]. Available: <https://www.healthline.com/health/skin-bleaching>
 8. Mahé A, Ly F, Aymard G, Dangou JM. Skin diseases associated with the cosmetic use of bleaching products in women from Dakar, Senegal. *Br J Dermatol* [Internet]. 2003;148(3):493–500. [Cited 2022 Aug 9] Available: <https://onlinelibrary.wiley.com/doi/full/10.1046/j.1365-2133.2003.05161.x>
 9. Pitché P, Kombaté K, Tchangai-Walla K. Cosmetic use of skin-bleaching products and associated complications. *Int J Dermatol*. 2005;44(SUPPL. 1):39–40.
 10. Ly F, Soko AS, Dione DA, Niang SO, Kane A, Bocoum TI, et al. Aesthetic problems associated with the cosmetic use of bleaching products. *Int J Dermatol* [Internet]. 2007;46(SUPPL. 1):15–7. [Cited 2022 Aug 10] Available: <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-4632.2007.03456.x>
 11. Dlova NC, Hamed SH, Tsoka-Gwegweni J, Grobler A. Skin lightening practices: an epidemiological study of South African women of African and Indian ancestries. *Br J Dermatol* [Internet]. 2015;173 Suppl 2(S2):2–9. [Cited 2022 Aug 10] Available: <https://pubmed.ncbi.nlm.nih.gov/26207658/>
 12. [The problem of the use of mercurials cosmetics in Senegal (author's transl)]. Semantic Scholar [Internet]. [Cited 2022 Aug 10]. Available: <https://www.semanticscholar.org/paper/The-problem-of-the-use-of-mercurials-cosmetics-in-Gras-Mondain/6cf540ece624a5b9e0c673c7addae87a60da9510>
 13. Aljunaiyeh H, Naif A, Kadhim K. Non-prescription skin lightening preparations; Their Use & Hazards in Iraq. Available online www.ijpras.com *Int J Pharm Res Allied Sci* [Internet]. 2018;7(2):209–17. [Cited 2022 Aug 10] Available: www.ijpras.com
 14. Olumide YM, Akinkugbe AO, Altraide D, Mohammed T, Ahamefule N, Ayanlowo S, et al. Complications of chronic use of skin lightening cosmetics. *Int J Dermatol* [Internet]. 2008;47(4):344–53. [Cited 2022 Aug 10] Available: <https://pubmed.ncbi.nlm.nih.gov/18377596/>
 15. Petit A, Cohen-Ludmann C, Clevenbergh P, Bergmann JF, Dubertret L. Skin lightening and its complications among African people living in Paris. *J Am Acad Dermatol* [Internet]. 2006 ;55(5): 873–8. [Cited 2022 Aug 10] Available: <https://pubmed.ncbi.nlm.nih.gov/17052496/>
 16. Del Giudice P, Yves P. The widespread use of skin lightening creams in Senegal: A persistent public health problem in West Africa. *Int J Dermatol* [Internet]. 2002;41(2):69–72. [Cited 2022 Aug 10] Available: <https://pubmed.ncbi.nlm.nih.gov/11982639/>
 17. Ahoofe Kasa. Skin bleaching and the function of beauty among ghanaian women | Blay | JENdA: A Journal of Culture and African Women Studies [Internet]. [Cited 2022 Aug 10]. Available: <https://www.africaknowledgeproject.org/index.php/jenda/article/view/528>
 18. Simmons BJ, Griffith RD, Bray FN, Falto-Aizpurua LA, Nouri K. Exogenous ochronosis: A comprehensive review of the diagnosis, epidemiology, causes, and treatments. *Am J Clin Dermatol* [Internet]. 2015;16(3):205–12. [Cited 2022 Aug 10] Available: <https://pubmed.ncbi.nlm.nih.gov/25837718/>
 19. Engler DE. Mercury “bleaching” creams [13]. *J Am Acad Dermatol*. 2005;52(6):1113–4.
 20. Pels R, Sterry W, Lademann J. Clobetasol propionate--where, when, why? *Drugs Today (Barc)* [Internet]. 2008;44(7): 547–57. [Cited 2022 Aug 10] Available: <https://pubmed.ncbi.nlm.nih.gov/18806904/>
 21. Topical steroid abuse: its use as a depigmenting agent - PubMed [Internet]. [Cited 2022 Aug 10]. Available: <https://pubmed.ncbi.nlm.nih.gov/16775916/>
 22. Depigmentation for cosmetic purposes: prevalence and side-effects in a female population in Senegal] - PubMed [Internet].

- [Cited 2022 Aug 10].
Available: <https://pubmed.ncbi.nlm.nih.gov/11460033/>
23. Dey V. Misuse of topical corticosteroids: A clinical study of adverse effects. *Indian Dermatol Online J* [Internet]. 2014;5(4):436.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/25396124/>
24. Boyle J, Kennedy CTC. Hydroquinone concentrations in skin lightening creams. *Br J Dermatol* [Internet]. 1986;114(4):501–4.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/3964548/>
25. Oliveira DBG, Foster G, Savill J, Syme PD, Taylor A. Membranous nephropathy caused by mercury-containing skin lightening cream. *Postgrad Med J* [Internet]. 1987;63(738):303–4.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/3684841/>
26. Leucomelanoderma in blacks. A recent epidemic - PubMed [Internet].
[Cited 2022 Aug 10].
Available: <https://pubmed.ncbi.nlm.nih.gov/4852984/>
27. Bongiorno MR, Aricò M. Exogenous ochronosis and striae atrophicae following the use of bleaching creams. *Int J Dermatol* [Internet]. 2005;44(2):112–5.
[Cited 2022 Aug 10]
- Available: <https://pubmed.ncbi.nlm.nih.gov/15689207/>
28. DeCaprio AP. The toxicology of hydroquinone--relevance to occupational and environmental exposure. *Crit Rev Toxicol* [Internet]. 1999;29(3):283–330.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/10379810/>
29. Cribier B, Peltre B, Langbein L, Winter H, Schweizer J, Grosshans E. Unregulated use of clobetasol propionate. *Br J Dermatol* [Internet]. 2001;144(5):1095–6.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/11359411/>
30. Barr RD, Rees PH, Cordy PE, Kungu A, Woodger BA, Cameron HM. Nephrotic syndrome in adult Africans in Nairobi. *Br Med J* [Internet]. 1972;2(5806):131–4.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/4111681/>
31. Weldon MM, Smolinski MS, Maroufi A, Hasty BW, Gilliss DL, Boulanger LL, et al. Mercury poisoning associated with a Mexican beauty cream. *West J Med* [Internet]. 2000;173(1):15.
[Cited 2022 Aug 10]
Available: <https://pubmed.ncbi.nlm.nih.gov/14530526/>
32. Large-scale mercury exposure due to a cream cosmetic: community-wide case series - PubMed [Internet].
[Cited 2022 Aug 10].
Available: <https://pubmed.ncbi.nlm.nih.gov/14530526/>

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