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Steroid driven skin lightening, a public health concern and its impact on Somali women in Kenya: An integrative review

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Abstract

Background: Steroid misuse among Somali women in Kenya continues to pose a serious public health challenge. Recent findings indicate that approximately 66% of women in this community have either used skin-lightening steroids themselves or know someone who has, often in pursuit of socially constructed beauty ideals. Despite being aware of the dermatologic side effects, many users persist frequently without knowledge of the products' actual ingredients or long-term risks. This study seeks to unpack the underlying drivers of steroid misuse, identify key influencers and distribution channels, and examine the systemic health consequences. Our ultimate goal is to inform targeted public awareness strategies that can help curb the prevalence of unsafe steroid use.

Methodology: This research adopts an integrative review approach, synthesizing findings from previously published literature across varied methodologies. The included studies span retrospective and prospective analyses, laboratory-based investigations, and existing systematic reviews. Using targeted search terms "Steroids," "Abuse," and "Steroids AND Somali" a total of 24 articles were retrieved, with 11 meeting the inclusion criteria after screening for relevance and duplication.

In addition to the systematic review, the study incorporates primary data collected via a Google Form designed with Somali-language translations to ensure participant comprehension. This tool explored the underlying drivers of steroid misuse, including social motivators, enabling factors, and potential strategies for prevention and public health intervention.

Expected outcome and Significance: We aim to explore the cultural and social norms within the Somali community that shape prevailing beauty standards particularly the perception that lighter skin is more desirable. These norms appear to be key drivers behind the use of steroid-containing products, often without users knowing the ingredients or understanding the potential health risks. Through this research, we also intend to design a targeted awareness campaign that addresses these misconceptions and promotes safer, informed choices, with the broader goal of reducing steroid misuse.

Awareness campaign: in this study we have highlighted multiple mechanisms which can enable the population to be aware of the effects of these steroids. These mechanisms include an informative health poster.

Conclusion: In conclusion, the use of skin-lightening products containing steroids and harmful substances such as hydroquinone and mercury remains widespread. Many women who use these products are unaware of their ingredients and the potential health risks, driven instead by societal pressures to conform to narrow beauty standards. Encouragingly, a significant number of users have expressed willingness to discontinue use if properly informed. This

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study therefore aims to bridge that knowledge gap by fostering awareness, promoting safer choices, and ultimately reducing the prevalence of steroid misuse.

Keywords: Steroids; Somali; Skin-lightening; Abuse; Kenya

1. Introduction

Historically, traditional beauty practices across various cultures emphasized skin cleansing, protection, and natural radiance rather than alteration of complexion. These practices, often performed during weddings and religious or cultural ceremonies, incorporated cosmetic heritage ingredients regarded as cultural beauty staples—such as qasil among the Somali community, kaolin clay and shea butter in West Africa, rhassoul clay and henna in Morocco, saffron among Arab cultures, and turmeric in South Asia.

The emergence of modern corticosteroid-based and chemical lightening products has marked a shift from self-care to self-alteration, driven by colonial-era colorism, social pressures, and media influence. Although corticosteroids were originally developed for the management of inflammatory skin conditions, their misuse for cosmetic depigmentation has become increasingly prevalent, often leading to severe local and systemic complications. In Kenya, particularly within urban Somali communities, the easy over-the-counter availability of such products, coupled with limited literacy, poor regulation, and inappropriate prescriptions, has intensified this public health problem.

In countries in southern Africa and Eastern Africa, the larger proportion of the population use skin lightening creams to treat pigmentary disorders with a smaller proportion of about 38.7% who prefer a lighter skin tone. It is important to note that anti SL messages broadcasted in the 70s and government regulation of active lightening ingredients in South Africa has led to the lower rates of SL. South Africa was the first country in the world to ban bleaching products and had recently been joined by Cote d'Ivoire, Tanzania, Rwanda,Kenya and Ghana. Despite restrictions, patients are still able to obtain products from street vendors and cosmetic shops without counsel of a physician hence they are often unaware of the potential side effects

Cutaneous and systemic side effects from SL agents are underestimated, as a full list of ingredients, particularly in illegal products is rarely disclosed.

This study seeks to establish baseline data on the knowledge, attitudes, and practices surrounding topical steroid misuse to inform culturally sensitive awareness campaigns—such as Somali-language community workshops and radio programs—aimed at promoting accurate health information, body positivity, and self-acceptance.By advancing our understanding in the variables above, we aim to contribute towards knowledge on the public health significance of skin lightening in the population as well as its impact on healthcare and disease burden in this population. The findings are expected to equip healthcare workers with culturally competent strategies for patient education and contribute to bridging a critical gap in the literature regarding this culturally specific yet widespread form of drug misuse in Africa.

This integrative review synthesizes findings from clinical studies, cases, product analysis and surveys to explore the global epidemiology of skin lightening practices and their health consequences. It narrows the focus to the Somali community in Kenya, where skin lightening is prevalent among women. Cultural norms such as the preference among men for lighter skinned partners, alongside peer pressure, social media influence, and perceived socioeconomic benefits drive usage. Despite these motivations, awareness of the health risks remains low.

By integrating global evidence with local insights, this review highlights the urgent need for public health interventions, regulatory oversight and culturally sensitive education. It underscores the dermatological and systemic dangers of steroid-based skin lightening products and advocates for safer cosmetic practices and informed clinical engagement

1.1. Research question

What is the level of knowledge, attitudes and practices regarding the use of skin-lightening products containing corticosteroids among Somali community in Kenya and how can culturally tailored awareness programs reduce this misuse?

- PICO Breakdown of research question
- Population - Individuals using skin-lightening products globally, with a focus on Somali women in Kenya
- Intervention/Exposure - Use of skin-lightening products containing corticosteroids, hydroquinone, mercury, and other harmful agents

- Comparison - Individuals that don't use these products
- Outcomes - Dermatological and systemic health complications (eg skin atrophy, Immunocompromise etc) physiological impacts and long-term risks

1.2. Hypothesis

1.2.1. Primary hypothesis

Prolonged use of skin-lightening products containing corticosteroids predisposes Somali women in Kenya to systemic adverse effects that often go unrecognized, as attention is primarily directed toward dermatological manifestations.

1.2.2. Secondary hypothesis

- Most Somali women who use skin-lightening products containing corticosteroids do so without a clear understanding of the ingredients present in these products.
- Most Somali women who use skin-lightening products containing corticosteroids lack adequate knowledge of the potential systemic and dermatological adverse effects associated with their use.
- Somali women are likely to discontinue the use of skin-lightening products containing corticosteroids when provided with culturally appropriate and evidence-based education on their potential adverse effects.

2. Literature review

Despite growing attention to the health risks of skin lightening products, significant gaps persist across clinical, regulatory, and psychosocial domains. Most biomedical studies focus narrowly on dermatologic outcomes such as striae, acneiform eruptions, and exogenous ochronosis, with limited exploration of long-term systemic effects like adrenal suppression, nephrotoxicity, and neuropsychiatric sequelae from chronic exposure to corticosteroids, mercury, or hydroquinone. Topical steroids are dermatological formulations with anti-inflammatory effects that are used for the treatment of steroid responsive skin disorders e.g. Eczema, Psoriasis and Dermatitis. However, their potent anti-inflammatory, vasoconstrictive and depigmenting effects have led to widespread misuse for cosmetic skin lightening particularly in regions where lighter skin is socially idealized.

Topical steroids are divided into 4 groups according to their potency in keeping with British National Formulary (BNF) while American systems classify them into 7 classes, with class 1 corresponding to very potent, super-potent and ultra-high potency. Class 1 steroids are very potent e.g. clobetasol proprionate, Nerisone, Top Clear, Nuvotone, Movate. Their local side effects are commonly seen with prolonged usage (3wks) particularly on areas of skin like the face and flexures. Class 2 include; Betnovate, Diprisone, Betina, Topifrom. Class 3 include; Eumovate, bethamethasone valerate. Class 4 include; Hydrocortisone, aclovate.

The skin lightening creams available in the market often combine high-potency steroids with other harmful chemicals like; hydroquinone, mercury, kojic acid, Alphahydroxy acids/glycolic acids and other unknown products. Due to their unregulated and prolonged applications of such creams results in a spectrum of local and systemic effects some of which are mentioned below:

2.1. Local

Steroid-induced acne—Topical steroids suppress local and cutaneous immunity by; reducing Langerhans cell activity and macrophage function, inhibiting cytokine release, decreasing neutrophil chemotaxis, atrophy of sebaceous gland ducts and alter keratinization. All these effects predispose the skin to plugging of the follicles that creates an ample environment for microbial overgrowth often presenting as papulopustular lesions. The immunosuppressed state also suppresses the inflammatory response which masks the typical signs like erythema and scaling which can present late and worsen their prognosis e.g. seen in dermatophyte infections and mycoses.

Striae and telangiectasia—Corticosteroids inhibit; fibroblast proliferation, collagen (1and3) synthesis, glycosaminoglycan and elastin production- leading to thinning of dermis thus presenting linear, atrophic, reddish or silvery streaks in all areas of tension and fragile vasculature that appears as spider-like patterns of vessels as a result of dilatation of superficial dermal capillaries.

Hypertrichosis—Corticosteroids may stimulate hair follicle stem cells and increase anagenic(growth) phase duration hence leading to thick, long and rapidly growing hair on face, extremities or places where the steroids are repeatedly applied.

Macular hyperpigmentation –steroids directly stimulate the melanocytes and result in abnormal distribution of melanin across the skin basal layer, upon withdrawal of the steroid or post-inflammation, melanocytes are overstimulated in un uniform manner resulting in brownish color in some areas especially high tension or trauma areas and absence in other areas.

2.2. Systemic

Adrenal suppression—Steroids mimic endogenous glucocorticoids such as cortisol, therefore overstimulating adrenergic receptors. Consequently, the hypothalamus (↓ CRH) and anterior pituitary glands (↓ ACTH) suppression through the negative feedback mechanism causing the adrenal cortex to atrophy. When steroids are suddenly withdrawn the atrophied adrenal cortex fails to secrete enough cortisol to sustain normal bodily functions.

Diabetes mellitus –Steroids mimic glucocorticoid activity which usually have catabolic effects as a stress response. Abuse of steroids leads to excessive gluconeogenesis thus hyperglycemia in the vessels whilst absence of glucose in peripheral tissues. Initially there is compensatory hyperinsulinemia which eventually fatigues the beta cells of pancreas causing insulin resistance /steroid-induced diabetes mellitus.

Obesity—Steroids cause an imbalance between lipogenesis and lipolysis by stimulating lipogenesis in central fat deposits like the face, trunk, supraclavicular and neck regions and stimulates lipolysis in adipose tissues in peripheral regions like limbs –resulting in a cushingoid appearance i.e. moon face, buffalo hump, truncal obesity and thin limbs

Hypertension—high doses of glucocorticoids have minerocorticoid activity like; ↑ Na^+ reabsorption and water retention, ↑ K^+ excretion, ↑ Plasma volume and cardiac output, ↑ Vascular sensitivity to catecholamines via upregulation of α_1-adrenergic receptors thus a stronger vasoconstrictor response. All these will lead to high blood pressures which can chronically become hypertension.

2.3. Gaps

- Interdisciplinary: few studies integrate dermatology with; endocrinology, toxicology or psychology to get a holistic understanding.
- Practical: there is a lack of clinical guidelines for managing complications from cosmetic corticosteroid misuse.

2.4. Motivating factors

The statistics in a cross-sectional survey done on skin lightening practices, beliefs and self-reported adverse effects among female health science students in Barama. Somaliland showed that in comparing SL users with non-users, more SL users agreed that lighter skin color

gives a woman more confidence (40.3% vs. 20.5%; p = .006), helps a woman have better job opportunities (22.4% vs. 5.1%; p < .001), and increases a woman's chances of getting married (33.3% vs. 17.4%; p = .022) and that advertisements on television for SL products influence a women's preference for lighter skin tone (76.1% vs. 66.1%; p = .015). More SL users than non-users also thought that a lighter skin color makes a woman look younger (16.7% vs.

11.3%) and implies that a woman belongs to a high social class and that men consider women with a lighter skin color more beautiful (22.7% vs. 11.3%), but these differences did not reach statistical significance.

Many SL users (34.8%) chose their particular SL product based on the advice of a friend, and fewer took advice from a cosmetic store, pharmacist, or physician.

2.5. These trends can be better understood in the context below

Colonial-era colorism mindset –During colonial rule, lighter skin was often equated with power, beauty, intelligence, and higher social class, while darker skin was associated with inferiority and servitude. This legacy of colorism persists in many postcolonial societies, where fair skin continues to symbolize modernity, success, and upward social mobility. Consequently, many individuals, both men and women, internalize these hierarchical notions of skin tone and pursue lighter skin as a means of achieving social acceptance and esteem.

Perceived social benefits—In many communities, lighter skin is believed to enhance one's attractiveness, marriage prospects, and employment opportunities—particularly in industries such as media, entertainment, and business, where appearance is heavily emphasized. Such perceptions reinforce the belief that skin tone can directly influence

socioeconomic advancement, thus normalizing and perpetuating the use of skin lightening agents without a clear understanding of long-term health risks.

Persistent marketing from multinational cosmetic companies—The multinational cosmetic companies have put all possible strategies in place to ensure the continued consumption of their products regardless of the long-term health risks. They often exploit existing insecurities among young consumers and cultural bias. They subtly frame fair skin as a marker of self-improvement and empowerment. The use celebrity endorsements, light skinned models and social media influencers to further engrave this beauty ideal.

To fit societal beauty standards—the pressure to conform to prevailing beauty standards in society significantly contributes to the widespread use of corticosteroid-containing skin lightening products. In many cultures, beauty is narrowly defined by hour-glass body shapes and lighter complexions. Individuals seeking to "fit in" with these ideals often resort to cosmetic skin lightening as a means of aligning with socially accepted notions of attractiveness. This conformity is further reinforced by peer influence, media portrayals, and societal validation of fair skin as the peak of beauty.

Accessibility — In many low- and middle-income countries, such products are readily available over the counter in pharmacies, beauty shops, and open-air markets without requiring a medical prescription. Moreover, the affordability of these products compared to professional dermatological treatments makes them attractive to individuals seeking rapid and inexpensive results. This unrestricted access, coupled with limited consumer awareness, creates an environment where misuse is common and largely unmonitored.

Based on the above motivators it is clear that the use of skin lightening products containing corticosteroids is deeply rooted in complex sociocultural, historical and economic factors. By addressing these 4 aspects we can get a greater impact towards addressing the problem at hand.

2.6. Gaps

- Temporal—motivators may evolve with media trends, but the longitudinal tracking to adjust to this times' trends is lacking.
- Practical—public health messaging often fails to address the emotional and cultural roots of skin-lightening behavior.
- Regulation of the skin-lightening industry and evasion tactics:
- Efforts to regulate the skin-lightening industry have been implemented at national and
- international levels, but enforcement remains inconsistent and often ineffective.

Regulatory measures–Several countries have banned harmful ingredients such as; mercury, hydroquinone and potent corticosteroids in cosmetic products. Maneli et al. (2016) conducted a spectroscopic analysis of internationally manufactured products and found that many contain illegal combinations of these agents, even when not listed on the label. The presence of such practices has enabled the involved businesses to avoid the ban and regulatory constraints that are in place. Somerled (2022) notes that public health campaigns and clinical guidelines have been introduced to raise awareness and encourage safer practices.

Enforcement Challenges–Despite these measures, enforcement is weak. Products continue to be sold through informal markets, online platforms, and cross-border trade. Wallander et al. (2015) and Olumide et al. (2008) both emphasize the global scope of the problem and the difficulty of regulating informal economies. Users often circumvent bans by mixing prescription steroids with over-the-counter creams or importing products from countries with lax regulations.

Community Resistance and Misinformation–Cultural resistance to regulation is another barrier. In communities where skin lightening is normalized, regulatory messages may be dismissed or ignored. Yusuf et al. (2019) found that even among health science students, awareness of risks did not always translate into behavior change.

2.7. Gaps

Temporal –Regulatory responses often lag behind evolving product formulations and distribution methods.

Interdisciplinary–Minimal collaboration between different disciplines like dermatologists, policy makers, economists and anthropologists.

There is a notable absence of longitudinal cohort studies that track cumulative toxicity or endocrine disruption over time, especially in populations with sustained use. Furthermore, motivations for skin lightening remain underexplored in East African contexts, where cultural norms, peer influence, and economic aspirations intersect with colonial legacies of colorism. While global literature acknowledges beauty ideals and media pressure, few studies deeply investigate how these forces operate within informal economies, urban youth culture, or gendered expectations in Kenya and neighboring regions. Male and gender-diverse users are also largely excluded from research, despite emerging evidence of their participation and distinct psychosocial drivers. Regulatory gaps compound the problem: many countries lack centralized surveillance systems to monitor banned ingredients, product distribution, or adverse event reporting, and enforcement is weak in informal markets where unlabeled or counterfeit products circulate freely. Behavioral interventions are scarce, with few programs addressing body image, self-esteem, or social stigma as root causes of product use. Mental health support is rarely integrated into dermatologic care, and public health campaigns often rely on risk messaging without engaging communities in co-design or culturally sensitive dialogue. Linguistic barriers further limit reach, as educational materials and survey instruments are seldom translated into local languages or adapted to cultural idioms leaving Somali-speaking populations, for instance, underserved and underrepresented. Finally, there is minimal investment in community-based participatory research, which could empower users to shape narratives, challenge norms, and co-create safer alternatives. Addressing these gaps requires a multidisciplinary approach that blends clinical vigilance with sociocultural insight, policy reform, and inclusive public engagement. This research paper aims at addressing all these gaps in intricate details.

3. Research objectives

3.1. General objectives

- To explore the level of literacy and perceptions of Somali community around the use of skin-lightening products containing corticosteroids in Kenya
- To discover how cultural norms and beliefs of Somali community continues to perpetuate the misuse of skin lightening products containing corticosteroids
- To investigate the role of culturally tailored community education in minimizing the misuse of skin-lightening products containing corticosteroids

3.2. Specific objectives

- To understand why Somali women willingly start using these skin lightening products containing corticosteroids
- To discover how to help women who are on long term use of skin-lightening containing corticosteroids reduce their morbidity and mortality rates
- To discover the depth of perceived cultural norms/ beliefs about beautification and how the perpetuate the continued use of skin-lightening products
- To educate Somali men on importance of acknowledgement of beauty in all skin shades
- To investigate the level of impact of different awareness strategies in minimizing the misuse of these skin-lightening products
- To attempt to use multidisciplinary team to ensure a holistic approach towards the awareness against misuse of skin-lightening products containing corticosteroids

4. Research methodology

This research paper is an integrative review meaning we gathered data from both systematic review and meta-analysis of already published data with newly collected data.

The systematic review and analysis involve. The preferred reporting items for systematic reviews and meta-analyses PRISMA guideline was adopted for this study

4.1. Search strategy

A comprehensive search of PubMed, Wiley Cochrane Library, Clinicaltrials.gov and Embase databases were performed to identify relevant articles from database inception until 8th October 2025. The following terms in their specific criteria of issue addressed were used:

- Steroids AND abuse

- Steroids AND Kenya
- Steroids AND Somali
- Steroids AND lightening

Search was expanded by using vague terms such as “steroids” in the search strategy to identify more potentially relevant articles. The citations within the studies were assessed for other potentially suitable studies. 24 papers were located and 11 were found to fit the criteria with 0 duplicates.

4.2. Eligibility criteria

4.2.1. Types of studies

The studies included in this systematic review encompass a diverse range of methodologies, including retrospective and prospective analyses, laboratory based experimental designs, and previously published systematic reviews.

4.2.2. Types of participants

The participants must be women who have used steroids for skin lightening purposes or with a motive of attaining the set beauty standards and not for clinical uses.

4.2.3. Exclusion criteria

Studies with a quality score of 6 or less on the modified New-castle Ottawa scale or studies that lacked sufficient data on the above-mentioned criteria were excluded. Studies that discussed any condition that is not specifically steroid abuse were also excluded.

4.3. Study screening, selection and data extraction

Potentially suitable studies were evaluated and any uncertainties were discussed with the supervisor of the study. The titles and abstracts of the search results were screened for eligibility followed by removal of duplicate studies. All potentially suitable studies underwent full text review to assess eligibility. Eligible studies were included in this review. Data were extracted. The information, when available, was extracted from the studies: author, year of publication, type of study.

4.4. Quality assessment and data synthesis

All included studies were critically appraised for methodological quality. Data analysis was conducted using a narrative approach for narrative-oriented studies while meta-analysis was done for certain studies.

4.5. Characteristics of the papers included in the study

Table 1 Characteristics of papers involved in this paper

DOI	Title	Year	Type of Study	Aim of study	Main Findings	Number of patients
10.1016/j.ijwd.2020.09.006	The dark side of skin lightening: An international collaboration and review of a public health issue affecting dermatology.	2020 (eCollection 2021)	Narrative review/ international collaboration	Review the global public-health problem of skin-lightening, including misuse of topical steroids and health consequences.	Summarises dermatologic and systemic harms from skin-lightening agents (including topical steroids), public-health implications and regulatory/education needs.	N/A (review)
10.1111/CED.14972	Skin lightening: causes and complications	2022 (Epub 2021 Dec).	Narrative review	Describe causes/Drivers of skin-lightening behaviour and document complications of agents used (including steroids)	Highlights serious local/systemic complications from unregulated topical agents (hydroquinone, superpotent steroids, mercury) and need for clinician/public action.	N/A (review).
10.1002/SKI2.46	Prevalence, determinants and perception of use of skin-lightening products among female medical undergraduates in Nigeria	2021	Cross-sectional survey	Determine prevalence, determinants and perceptions around use of skin-lightening products in female medical students.	40.9% reported use; determinants included preference for lighter skin and peer/family influence.	110 respondents
10.1016/J.IJWD.2019.08.006	Skin lightening practices, beliefs, and self-reported adverse effects among female health science students in Borama,	2019 (Int J Womens Dermatol article).	Cross-sectional survey.	Assess prevalence, beliefs and adverse effects of skin-lightening products among	Documented common use and self-reported adverse effects; highlights misconceptions and	Sample size reported in paper (see full text). Abstract does not give a single

	Somaliland: a cross-sectional survey.			female health science students.	public-health concerns.	pooled N in the indexed record
10.1111/J.1365-4632.2005.02812.X	Consequences of skin bleaching in Nigerian men and women	2005	Descriptive / report (conference supplement article).	Describe dermatologic, medical, psychosocial consequences of skin-bleaching in Nigerians.	Documents multiple adverse outcomes associated with bleaching (skin changes, psychological/social consequences).	N/A in abstract (article is a short report / supplement)
10.1111/J.1468-3083.2009.03150.X	Skin bleaching: highlighting the misuse of cutaneous depigmenting agents.	2009	Narrative review	Review appropriate medical use of depigmenting agents and highlight misuse, adverse effects and regulatory issues.	Calls attention to complications (steroid atrophy, ochronosis, systemic toxicity) and need for regulation/education.	N/A (review).
10.1016/j.det.2010.08.010	Widespread use of toxic skin-lightening compounds: medical and psychosocial aspects.	2011 (Dermatologic Clinics, article published online 2010)	Narrative / review (Dermatologic Clinics)	Review toxic lightening compounds (hydroquinone, steroids, mercury), medical complications and psychosocial context.	Summarises adverse dermatologic/systemic effects and psychosocial drivers; recommends policy/education	N/A (review).
10.1097/JW9.0000000000000092	Colorism attitudes and use of skin lightening agents in the United States.	2023	Cross-sectional / survey study (Int J Women's Dermatol).	Examine SL habits in skin-of-color individuals in the US and the role of colorism in motivating use.	Finds skin-lightening practices influenced by colorism; documents health concerns and prevalence patterns	N/A in summary record – see full article for sample size.
10.2310/7750.2011.10069	Toxic Effects of Skin-Lightening Products in Canadian Immigrants.	2011	Case series / case report (clinical description).	Describe cases of misuse of OTC skin-lightening products among	Presented two clinical cases with severe complications related to OTC products	2 cases (case series).

				Canadian immigrants, clinical presentations and toxicities	(including steroid misuse).	
10.1111/IJD.14052	The global prevalence and correlates of skin bleaching: a meta-analysis and meta-regression analysis	2019	Meta-analysis and meta-regression	Estimate global lifetime prevalence and investigate correlates of skin bleaching across studies	Finds skin bleaching is common in many regions; reports pooled prevalence and correlates (see full text for exact pooled estimates).	Number of included studies / pooled N reported in full article (not shown in brief record)
10.1016/j.jaad.2006.05.044	Skin lightening and its complications among African people living in Paris	2006	Descriptive clinical series.	Assess complications from skin lightening among African immigrants presenting to a Paris dermatology clinic	Complications were common and mainly linked to clobetasol and hydroquinone use.	46 patients described in the series

5. Summary of the papers

Yusuf et al. (2019) conducted a cross-sectional survey among 265 female health science students at Amoud University in Barama, Somaliland, to assess the prevalence, beliefs, and adverse effects of skin-lightening (SL) product use. The participants had a mean age of 21 +/- 2.0 years, and 91%. Approximately 94% had Fitzpatrick skin type III or darker. Overall, 25.6% (n = 68) of respondents reported having ever used SL products, and among these, 52.2% (n = 36) were current users. The mean age of first use was 17 +/- 2.5 years, and the average duration of use was 3.4 +/- 2.2 years. Regarding usage patterns, 64% of users applied only one product at a time, while 36% used two to five concurrently. Roughly 50.8% applied the products once daily or more, and 84.4% applied them to the face only. In terms of awareness, over 60% of users did not know the ingredients in their products. Of those who did, commonly reported components included clobetasol, betamethasone, hydroquinone, vitamin C, and hydrogen peroxide. Skin lightening users were significantly more likely than non-users to agree that lighter skin enhances a woman's confidence, job prospects, and marriage potential, and that television advertisements promote preference for lighter skin. As for motivation, 51.6% said they used SL products to treat pigment disorders, 38.7% because they preferred lighter skin, and 9.7% for both reasons. In terms of health impact, only 9% of users denied experiencing side effects. Reported cutaneous effects included skin atrophy (10.4%), acne vulgaris (5.9%), and allergic contact dermatitis (5.9%), alongside impaired wound healing, flushing, erythema, striae, telangiectasias, hypertrichosis, and exogenous ochronosis. Reported systemic effects included weight gain, hypertension, kidney damage, peripheral neuropathy, and mental health issues. Despite high awareness 91.6% acknowledged that SL products can cause undesirable skin effects and 88.8% believed they may cause internal harm 60% of respondents reported that no one had ever discussed stopping SL use with them, and only 13.8% said a doctor had addressed it. Among current users, 52.3% planned to quit, while 21.9% found quitting somewhat or very difficult. In a market survey, the researchers analyzed 56 SL products sold locally: 22 listed corticosteroids (with 12 containing clobetasol) and 5 contained hydroquinone, though many lacked ingredient labels. A cross-sectional study conducted among 1,192 women in Kinondoni Municipality, Dar es Salaam, found that 55% of participants reported using skin-lightening products. The median age of users was 32 years. The most commonly used active ingredients were kojic acid (50%) and hydroquinone (34%), reflecting a preference for easily accessible and fast-acting compounds. The majority of respondents (82%) reported using these products primarily for beautification purposes, while only 1% indicated using them under medical prescription by a doctor. Social influences played a significant role in the adoption of skin-lightening practices, with peers, relatives, vendors, and social media being the most common sources of encouragement and product information. Factors such as affordability, product branding, and advertising were also significantly associated with continued use. Of significance, the study observed that women in certain occupations particularly those in customer-facing roles such as front-desk attendants and petty traders had a higher prevalence of skin-lightening practices. A study titled "Over-the-Counter Skin-Lightening Products in Somalia (Ma'alim and Funwie, 2022)" This descriptive study explored the use of over-the-counter (OTC) skin-lightening creams and lotions in Somalia, emphasizing both usage trends and associated complications. The findings revealed that a substantial proportion of Somali women used these products without any medical supervision, primarily due to the widespread availability and lack of regulatory control over cosmetic imports. Many of the creams analyzed were found to contain unlisted or harmful substances such as corticosteroids, hydroquinone, and mercury derivatives. Commonly reported adverse effects included acne, skin thinning, hyperpigmentation, and increased susceptibility to infections. The study highlighted that a significant number of users were unaware of these risks, underscoring a public health concern exacerbated by the absence of cosmetic regulation and consumer education. It concluded that stricter policies, labeling standards, and awareness campaigns are urgently needed to address unsafe skin-lightening practices in Somalia. A study titled "Knowledge, Prevalence, and Perception of Skin-Lightening Products Among Female Undergraduates in Nigeria (2025)" which was a survey that was done on 402 female undergraduate students at the University of Calabar, Nigeria, revealed that 70% of participants had a good understanding of what skin-lightening products are, and 73% were aware of their potential risks and adverse effects. Despite this awareness, 54% admitted to having used skin-lightening products at least once, reflecting a disconnect between knowledge and behavior. The most frequently cited motivations included the desire for beauty, peer influence, and perceived social advantages associated with lighter skin tone. Many users reported mild side effects such as skin irritation, dryness, and uneven pigmentation, though few sought medical advice. The study concluded that while education about the dangers of skin-lightening is relatively high among young women, this knowledge often fails to translate into safer cosmetic choices highlighting the need for targeted behavioral interventions.

5.1. Newly collected data in this study

A google form was designed to include questions that address the origin of the steroid abuse norm, to the perpetrators and to finally the effects. The google form contains questions that are translated into Somali to allow easier understanding by the participants of the study:

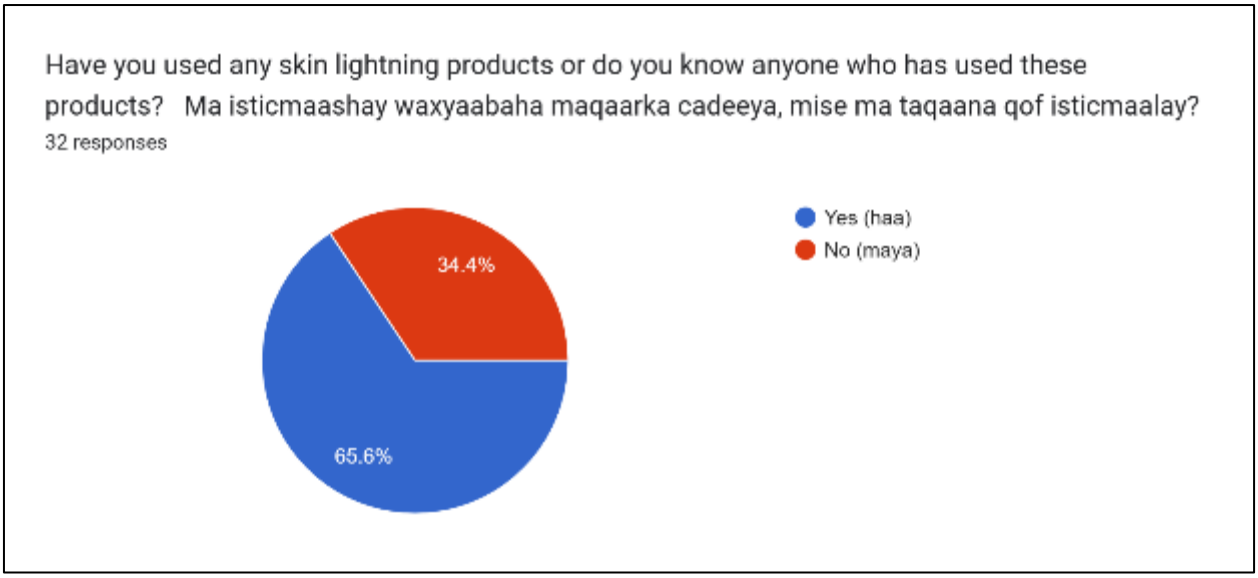

Figure 1 Question 1 of the questionnaire with responses in pie chart form

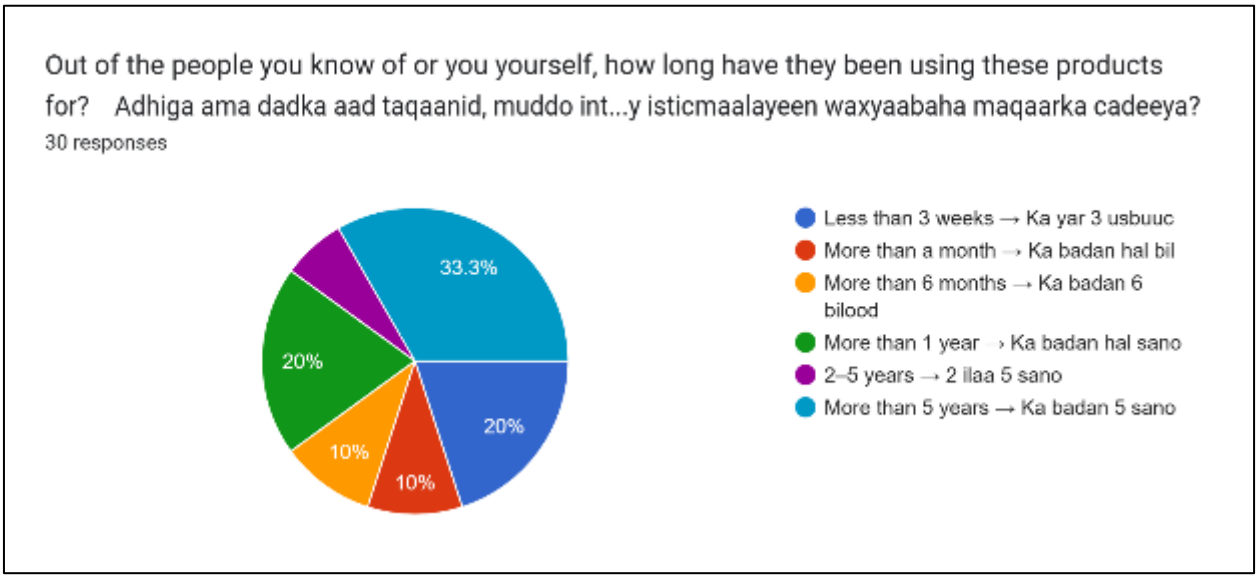

Figure 2 Question 2 of the questionnaire with responses in pie chart form

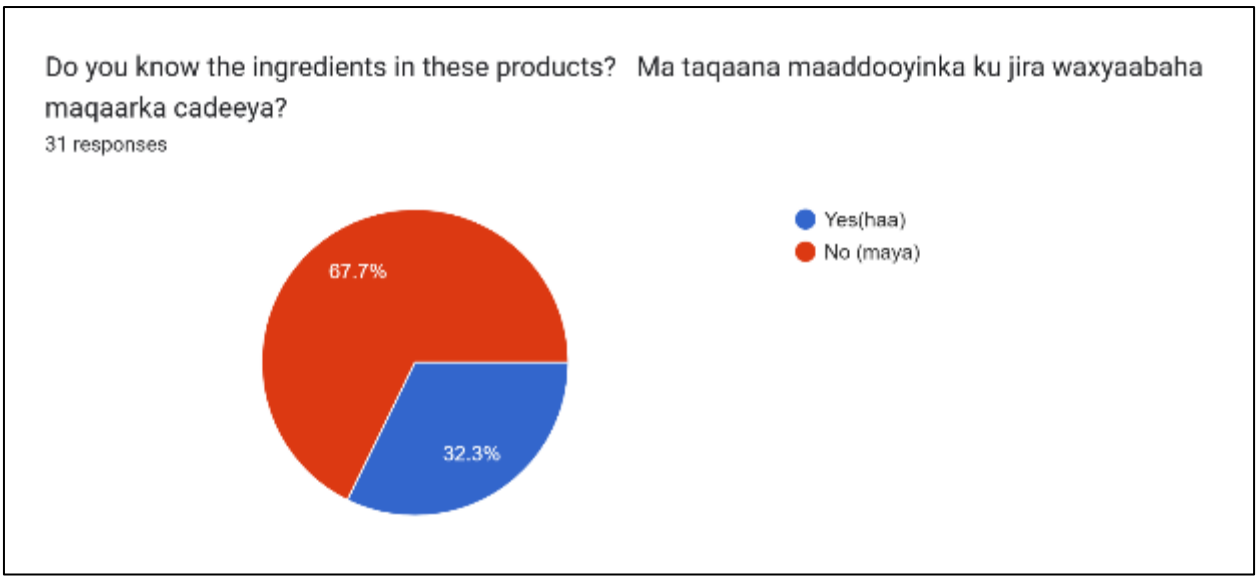

Figure 3 Question 3 of the questionnaire with responses in pie chart form

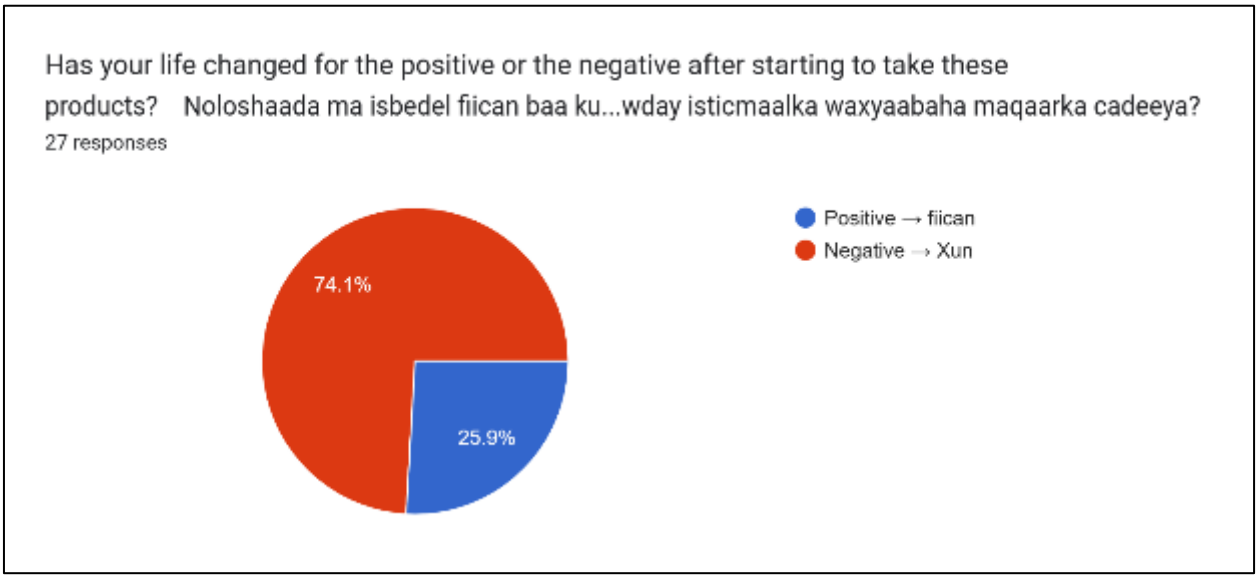

Figure 4 Question 4 of the questionnaire with responses in pie chart form

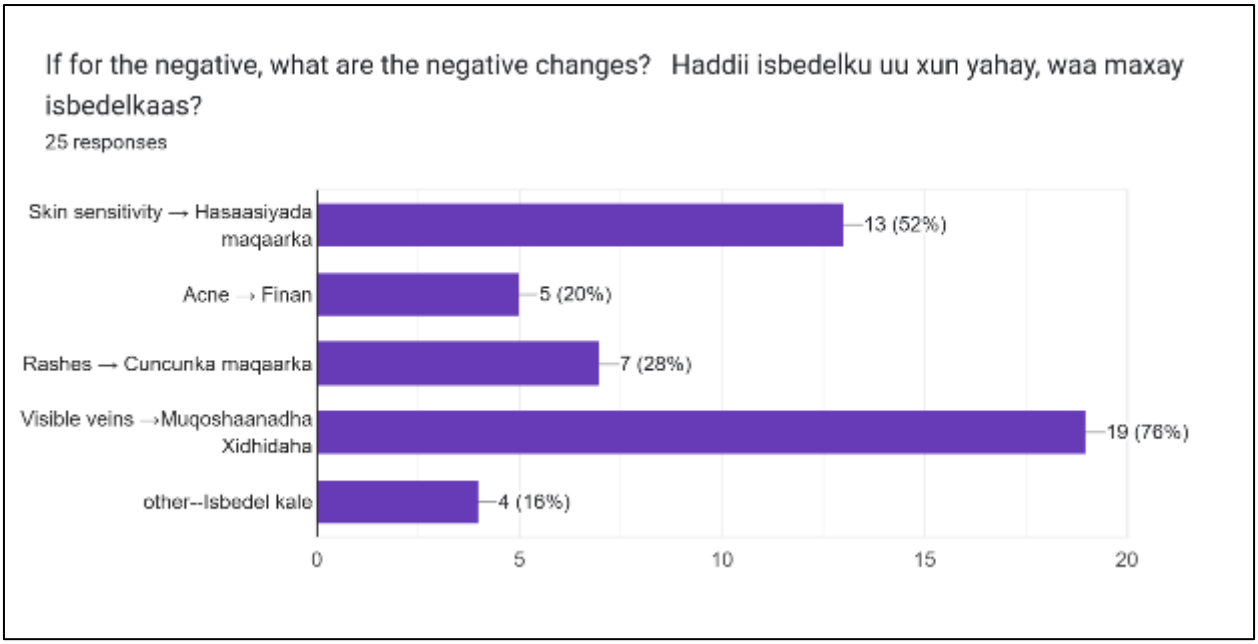

Figure 5 Question 5 of the questionnaire with responses in bar graph format

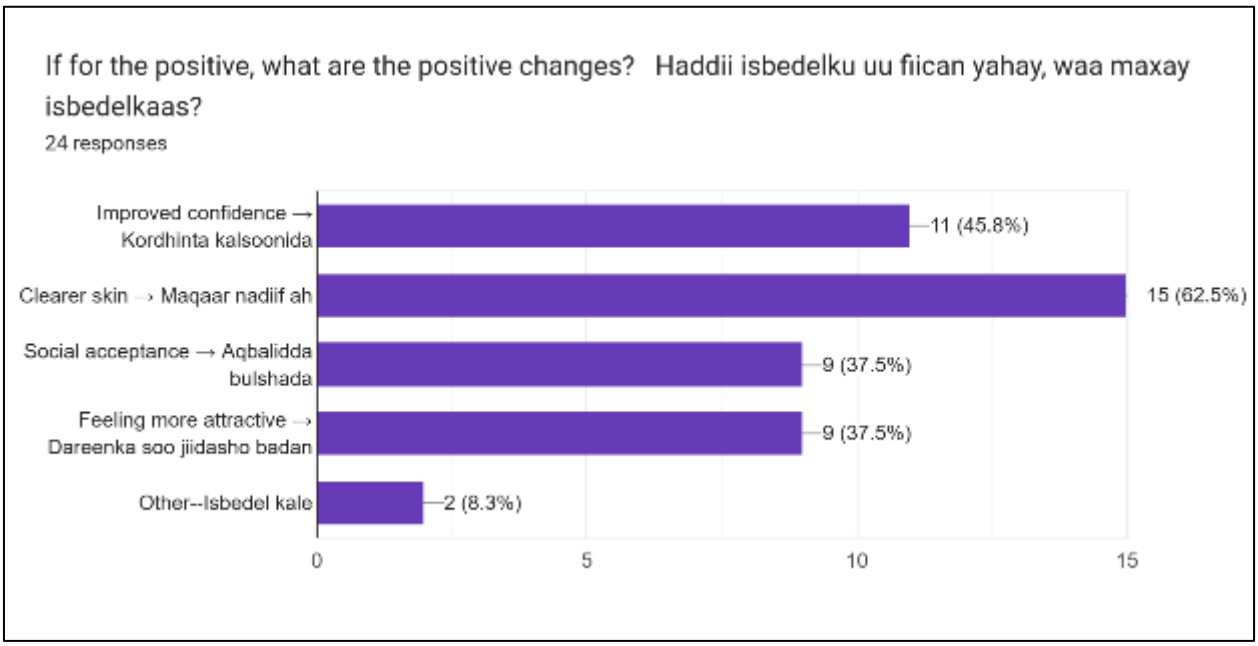

Figure 6 Question 6 of the questionnaire with responses in bar graph format

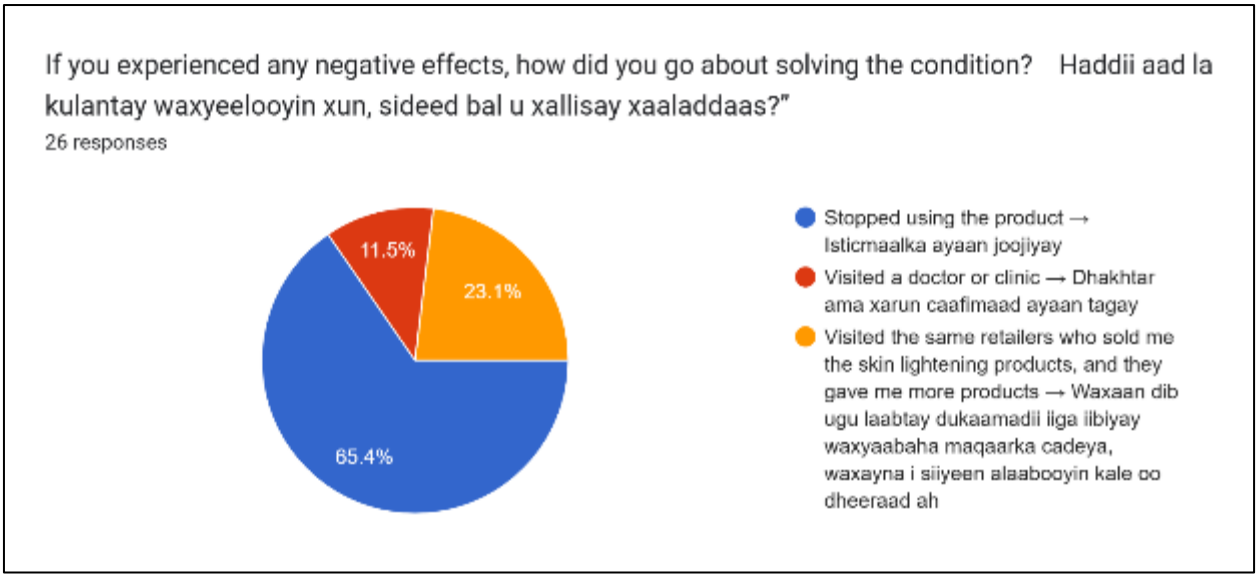

Figure 7 Question 7 of the questionnaire with responses in pie chart format

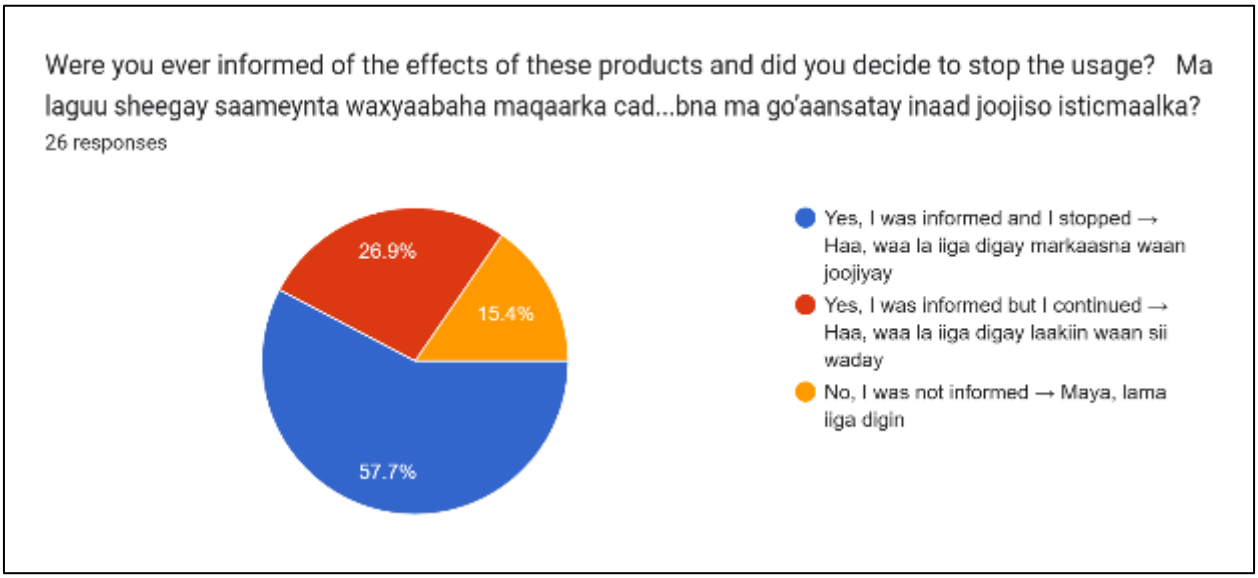

Figure 8 Question 8 of the questionnaire with responses in pie chart format

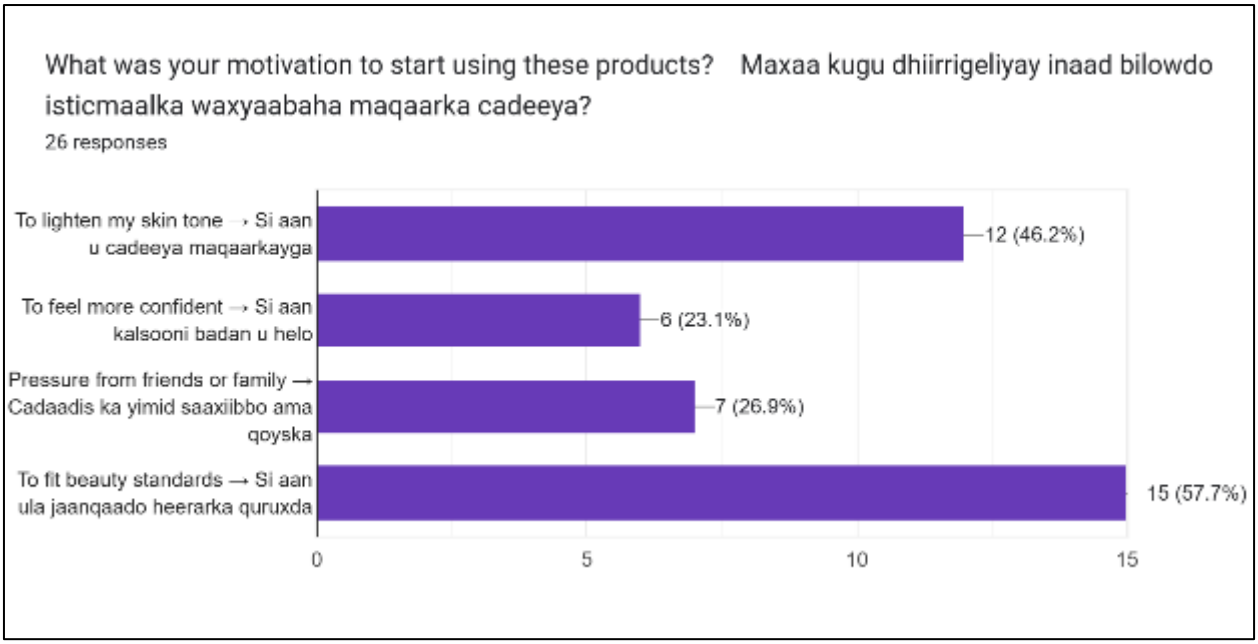

Figure 9 Question 9 of the questionnaire with responses in bar graph format

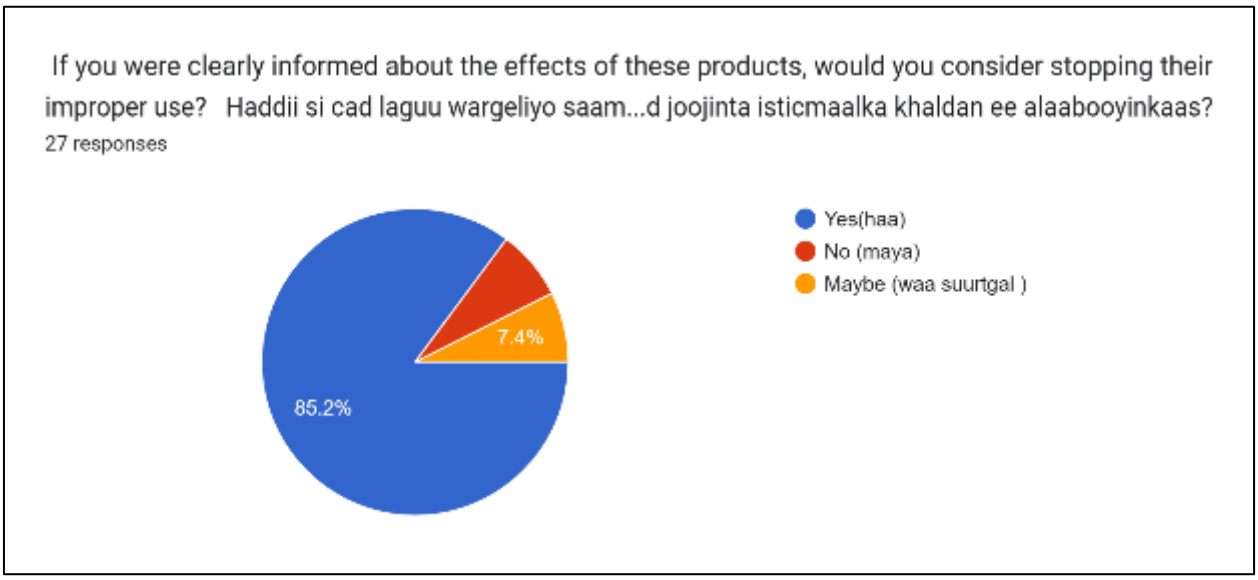

Figure 10 Question 10 of the questionnaire with responses in pie chart format

6. Discussion

Steroids abuse has relatively been well documented. However, the existing literature mainly targets androgenic steroid abuse and less topical steroids abuse for its skin lightening effects. In this study, we have delved into understanding from the basic motivators of this abuse, to the perpetrators of the condition and finally its effects and how we plan to alleviate or possibly eradicate this condition.

Through this study, it was discovered that 68% of women involved in this study have used or know someone who uses topical steroids for skin lightening/ beauty purposes hence proving the aspect of abuse. Out of these 69%, 32% of them have used these products for more than 5 years followed by 21% for more than a year and the rest for more than a month. A study done stated that long term/ systematic effects of steroid abuse began after 3 weeks of constant abuse. Having applied this perspective to this study it is obvious that these subjects have already begun experiencing long term

effects despite the effects not presenting outwardly. 71% of these subjects claimed to not know the ingredients of these supposed "beauty products" while a staggering 64% of them claiming to have a negative life projection after beginning to use these products. These negative effects are localized to dermatologic conditions the highest ranked being visible veins a 42% followed by rashes, acne and skin sensitivity while claiming the positive reasons that make them to continue using these products being to get clearer skin at 31% followed by improved confidence, social acceptance and feeling more attractive and their greatest motivation being to fit the set beauty standards and feel more confident.

For those who experienced negative effects majority of them (54% stopped using the products, 2% visited a doctor while 21% of them visited the same retailers for more steroid containing creams which supposedly should get rid of those negative effects and for those who stopped often go back to using them when the negative effects alleviate. 46% of them who were warned about the effects of these products stopped using them while 71% of the subjects claim to stop use of those products if they are well educated about their effects.

In order to put a stop to this vicious cycle that seems to be passed down from one generation to another, this study has decided to explain the detrimental effects of these products to each body system so that the information can be used to educate them as they claim this could convince them to stop the steroid abuse.

Despite topical steroids being designed to cause minimal effects, when they are used for a long time (more than 3 weeks) in formulations that enhance absorption such as hydroquinone and mercury on skin that has compromised integrity such as that which has been exposed to steroid abused then their transdermal diffusion and follicular glandular routes of absorption increase causing a high plasma concentration. The estimated absorption rate on normal skin is about 1-5% while on damaged skin is about 10-20% more.

6.1. Integumentary system

6.1.1. Immediate effects (minutes to hours)

Effects: Mild vasoconstriction after topical application (blanching); transient decreased erythema because of immediate non-genomic vascular effects.

Pathophysiology: Rapid non-genomic effects on vascular smooth muscle and endothelial cells lead to reduced local blood flow and visible blanching. Genomic anti-inflammatory actions begin but take hours.

6.1.2. Short term effects (days to weeks)

Effects: Acneiform eruptions, increased hair growth in treated areas (localized hypertrichosis), delayed wound healing beginning to appear (if topical or systemic).

Pathophysiology: Genomic downregulation of inflammatory cytokines and growth factors that normally promote keratinocyte and fibroblast proliferation and wound healing; altered sebaceous gland activity can precipitate acneiform changes. Repression of collagen and matrix protein expression begins.

6.1.3. Long term effects (months to years)

Effects: Skin atrophy (epidermal thinning, dermal collagen loss), striae distensae (stretch marks), telangiectasia, easy bruising (purpura), increased fragility, hypopigmentation, impaired barrier function. Subcutaneous fat loss and muscle atrophy under prolonged systemic therapy.

Pathophysiology

- Inhibition of fibroblast proliferation and downregulation of collagen synthesis (types I and III) causing dermal thinning and loss of tensile strength.
- Reduced glycosaminoglycan and extracellular matrix production causes a decrease in dermal volume and elasticity causing striae and tearing.
- Apoptosis / reduced proliferation of keratinocytes causes epidermal skin thinning.
- These effects are mediated by chronic transcriptional changes (repressed TGF-β signalling, altered PI3K/AKT pathways implicated)

6.2. Endocrine system

As a hormone, glucocorticoids exhibit multiple effects on the endocrine system, primarily causing adrenal insufficiency, hyperglycemia and Cushing's syndrome in adults. With prolonged use of corticosteroid therapy, corticosteroids suppress adrenal function. The key mechanism through which this occurs is via suppression of the hypothalamic pituitary adrenal axis via a negative feedback mechanism. Systemic corticosteroids provide a negative feedback mechanism to the hypothalamus and pituitary gland, reducing corticotropin releasing hormone [CRH] and adrenocorticotropin hormone release [ACTH]. Decreased ACTH leads to decreased stimulation of the adrenal cortex and adrenal atrophy particularly in the zona fasciculata and reticularis. On sudden withdrawal of corticosteroid use, adrenal insufficiency occurs. The clinical presentation is variable and nonspecific, often being mistaken for symptoms of intercurrent illness. It presents with symptoms of fatigue, lethargy, a morning headache, weight loss, anorexia, gastrointestinal complaints like nausea, vomiting and diarrhea, as well as sugar cravings. It may also lead to orthostatic hypotension. In children, it also causes poor growth and weight gain. Due to the non-specific symptomatology of adrenal insufficiency, the condition may go unrecognized until exposure to physiological stress like illness, injury or surgery leading to an adrenal crisis. Adrenal crisis presents with hypotension, shock, impaired consciousness and severe abdominal pain. In children, it may present with lethargy, hypoglycemia and seizures. There is also an increased risk of death in their population.

Corticosteroids also mimic high levels of cortisol in the body causing Cushing syndrome as well as suppressing the hypothalamic pituitary adrenal axis. Cushing's syndrome has an insidious onset and presents, with generalized obesity, a rounded face with prominent cheeks and a flushed appearance usually referred to as moon facies as well as growth failure. Cushingoid features may develop within the first 2 months of therapy. One study evaluating the prevalence of Cushingoid abnormalities in 88 patients initiating long term systemic corticosteroid therapy (initial daily dose ≥20 mg of prednisone or equivalent) found the cumulative incidence rates of these abnormalities to be 61% at 3 months and almost 70% at 12 months. The features demonstrate a linear frequency with dose. The risk of development of cushingoid features is higher in younger patients and those with a high body mass index. In the pediatric population, Cushing syndrome presents similarly to adults with truncal obesity, skin changes and hypertension as prominent features. However, it also causes growth deceleration in this population.

Systemic corticosteroids may cause hyperglycemia. The mechanism through which this occurs is multifactorial. This includes augmentation of hepatic gluconeogenesis, inhibition of glucose uptake in adipose tissue, and alteration of receptor and post receptor functions. This leads to an increase in fasting glucose levels with a significant increase in postprandial values in patients without pre- existing diabetes mellitus. In a case-control study of Medicaid recipients, the relative risk of developing hyperglycemia requiring glucose-lowering therapy increased progressively with increasing glucocorticoid dose. The risk factors for glucocorticoid induced hyperglycemia are thought to be the same as other patients i.e. a family history of diabetes, increased age, obesity and a history of gestational diabetes. New onset hyperglycemia, a nonketotic hyperosmolar state or diabetic ketoacidosis can develop without warning in these patients especially when they develop early subclinical diabetes or glucose intolerance. In patients with pre-existing diabetes mellitus or glucose intolerance, they may exhibit higher blood glucose levels while on corticosteroid therapy leading to difficulty with glycemic control.

6.3. Reproductive system

6.3.1. Gynecological effects

Corticosteroids can disrupt normal reproductive function by interfering with the hormonal control of the hypothalamic–pituitary–gonadal (HPG) axis. They exert negative feedback on the hypothalamic–pituitary–adrenal (HPA) axis, which indirectly suppresses the release of gonadotropin-releasing hormone (GnRH). This suppression reduces the secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH), impairing follicle development and ovulation. As a result, chronic corticosteroid exposure may cause anovulation, menstrual irregularities, and reduced fertility.

At the ovarian level, corticosteroids inhibit key steroidogenic enzymes such as aromatase and 17β-hydroxysteroid dehydrogenase, leading to reduced estrogen and progesterone production. This hormonal imbalance disrupts endometrial growth and luteal phase function, contributing to implantation failure and early pregnancy loss. Additionally, high glucocorticoid levels lower ovarian insulin-like growth factor 1 (IGF-1), an important factor for normal follicular development.

Metabolic and vascular changes further worsen reproductive dysfunction. Systemic corticosteroids promote insulin resistance, hyperinsulinemia, and abnormal lipid metabolism—features resembling polycystic ovary syndrome (PCOS).

Their vasoconstrictive and hypertensive effects can also reduce uterine blood flow, compromising endometrial receptivity and placental perfusion.

6.3.2. Effects during pregnancy

Prolonged or high-dose corticosteroid use during pregnancy poses several risks for both mother and fetus.

For the mother, corticosteroids increase blood glucose levels by promoting gluconeogenesis and insulin resistance, predisposing to gestational diabetes. Their mineralocorticoid-like activity causes sodium and water retention, contributing to hypertension and pre-eclampsia-like features. The immunosuppressive properties heighten vulnerability to infections and slow wound healing.

The placenta plays a protective role by converting active cortisol to its inactive form through the enzyme 11β-hydroxysteroid dehydrogenase type 2 (11β-HSD2). However, chronic corticosteroid exposure or maternal stress can suppress this enzyme, allowing excess glucocorticoids to cross into the fetal circulation. This overexposure leads to "fetal programming," influencing long-term growth and metabolic outcomes. Furthermore, corticosteroids may cause placental shrinkage or atrophy through several mechanisms: they inhibit trophoblast proliferation, reduce vascularization by suppressing vascular endothelial growth factor (VEGF) and nitric oxide synthase (NOS), and directly damage placental cells through oxidative stress and apoptosis. A smaller, poorly vascularized placenta cannot adequately deliver oxygen and nutrients, resulting in fetal growth restriction and low birth weight.

For the fetus, excess glucocorticoid exposure suppresses the developing hypothalamic–pituitary–adrenal (HPA) axis, leading to intrauterine growth restriction (IUGR) and low birth weight. Corticosteroids also impair cell growth, collagen formation, and angiogenesis, and may interfere with hippocampal development, affecting neurodevelopment and stress regulation later in life.

In the neonatal period, infants exposed to high maternal corticosteroid levels may experience temporary adrenal suppression, leading to hypoglycemia, hypotension, and poor stress tolerance. Some studies have linked maternal corticosteroid use to a modestly increased risk of cleft lip and palate, though findings vary.

Long-term offspring effects may include metabolic and neurobehavioral consequences. Prenatal glucocorticoid exposure can alter gene expression through epigenetic modifications, predisposing individuals to metabolic syndrome, hypertension, and dysregulated stress responses in adulthood. Female offspring may later experience reduced fertility due to impaired follicular development and hormonal signaling. Neurobehavioral outcomes, such as anxiety, attention deficits, and altered emotional regulation, have also been associated with glucocorticoid-induced changes in brain regions like the amygdala and hippocampus.

6.3.3. Renal system

The prolonged and frequent use of skin-lightening products containing corticosteroids poses significant risks to renal health through both direct and indirect mechanisms.

6.3.4. Direct effects

Corticosteroids interact with specific receptors in kidney cells, particularly glucocorticoid receptors (GR) and mineralocorticoid receptors (MR). Glucocorticoid receptors are found in the cytoplasm and membranes of renal cells such as podocytes and endothelial cells within the glomerulus. These receptors regulate several genomic activities, including the upregulation of anti-inflammatory proteins and the suppression of pro-inflammatory pathways.

In podocytes, GRs are crucial for maintaining the stability of the cytoskeleton, which supports the glomerular filtration barrier. Excessive corticosteroid exposure saturates these receptors, disrupting podocyte stability and leading to proteinuria. Some studies also suggest that corticosteroids can paradoxically worsen proteinuria by altering the podocyte actin cytoskeleton. Similarly, glucocorticoid signaling in endothelial cells influences vascular tone, blood pressure regulation, and may affect kidney fibrosis.

At high concentrations, corticosteroids may also bind to mineralocorticoid receptors, especially when the enzyme 11β-Hydroxysteroid Dehydrogenase Type 2 (11β-HSD2)—which normally prevents this cross-binding—is saturated. This interaction promotes sodium and water retention and potassium excretion in the distal renal tubules, resulting in volume overload, hypertension, and electrolyte imbalance over time.

6.3.5. Indirect effects

Corticosteroid-induced hypertension is one of the most common indirect pathways of renal injury. It occurs through several mechanisms: fluid and sodium retention, increased vascular reactivity to vasoconstrictors such as catecholamines and angiotensin II, and reduced nitric oxide production due to downregulation of endothelial nitric oxide synthase. Corticosteroids also enhance the activity of the renin-angiotensin-aldosterone system (RAAS) by increasing angiotensinogen and receptor sensitivity, further contributing to elevated blood pressure. Chronic hypertension, in turn, damages renal blood vessels and glomeruli, leading to chronic kidney disease (CKD) through both hemodynamic strain and inflammatory pathways.

In addition, corticosteroids promote hyperglycemia by increasing glucose production and reducing insulin sensitivity. Prolonged hyperglycemia can progress to diabetes mellitus—a leading cause of CKD. Persistent elevated blood glucose causes glomerular injury and proteinuria characteristic of diabetic nephropathy, where early endothelial dysfunction and microalbuminuria signal ongoing renal damage. Hyperglycemia also activates intracellular pathways, such as protein kinase C in renal endothelial cells, further promoting vascular and glomerular injury.

6.4. Immune System

6.4.1. Immediate Effects (Minutes to Hours)

Rapid suppression of local inflammation ie. Reduced redness, swelling, and warmth leading to compromised response to damage to mucosa

6.4.2. Pathophysiology

Non-genomic suppression of inflammatory mediators leads to Inhibition of phospholipase A_2 causing a decrease in arachidonic acid, prostaglandins and leukotrienes. Direct inhibition of NF-κB and AP-1 transcription factors causes downregulation of IL-1, TNF-α, IL-6 synthesis.

Vasoconstriction limits immune cell trafficking to the site. Immediate decrease in capillary permeability curtails edema. These rapid effects account for the instant relief and blanching seen with topical steroid use.

6.4.3. Short-Term Effects (Days to Weeks)

effects

Local immunosuppression becomes evident

- Increased susceptibility to superficial infections; fungal (tinea incognito), bacterial (impetigo), viral (herpes simplex, warts).
- Delayed wound healing and reduced granulation tissue.
- Flattening of inflammatory lesions (eczema, psoriasis) due to immune quiescence.

6.4.4. Pathophysiology

Cellular immune suppression caused by

- Decrease in Langerhans cell and dendritic cell density in the epidermis causing impaired antigen presentation.
- Decrease in IL-1, IL-12, and IFN-γ causing reduced Th1 cell activation.
- Decreased macrophage activity and phagocytosis.

Humoral immunity effects

- Decreased local Ige- and IgG-mediated responses in dermis.
- Reduced mast cell degranulation leading to less histamine release.
- Wound healing impairment due to; decreased fibroblast proliferation and collagen synthesis, reduction in VEGF activity causing diminished angiogenesis at wound sites.

Pathologic outcome: Steroid-modified infections; pathogens proliferate under immunosuppressed skin but appear deceptively non-inflammatory (“tinea incognito”)

6.5. Lymphatic system

The lymphatic system is a vital part of both the circulatory and immune systems. It maintains fluid balance, absorbs lipids, and plays a central role in immune defense by transporting immune cells and clearing pathogens. However, the misuse of skin-lightening products containing corticosteroids can lead to systemic absorption of these potent immunosuppressants, significantly disrupting the normal functioning of the lymphatic system mainly through their effects on immune cells and their movement within lymphatic tissues.

6.6. Mechanisms of disruption

Glucocorticoid receptors are found in almost all nucleated cells, including key immune cells such as lymphocytes, macrophages, and dendritic cells. This widespread receptor presence makes the lymphatic system particularly vulnerable to corticosteroid effects. These drugs alter immune responses primarily through their strong anti-inflammatory and immunosuppressive properties, which interfere with immune cell activity and trafficking.

First, corticosteroids suppress the production of inflammatory cytokines and enhance the expression of immunosuppressive proteins, weakening cell-mediated immunity. This reduces the lymphatic system's ability to respond effectively to infections and abnormal cells. Second, they can trigger programmed cell death (apoptosis) in lymphocytes particularly T and B cells leading to reduced immune cell numbers and diminished adaptive immunity.

Corticosteroids also cause lymphocytes to remain in circulation instead of migrating into lymph nodes, resulting in lymph node shrinkage and lymphopenia. This limits immune surveillance and reduces the body's ability to detect and respond to infections. Additionally, corticosteroids inhibit leukocyte recruitment to inflamed tissues and alter the expression of adhesion molecules on endothelial cells, disrupting the normal trafficking of immune cells to and from lymphatic tissues.

6.6.1. Pathological outcomes

Chronic corticosteroid exposure leads to widespread immunosuppression, making individuals more susceptible to infections due to impaired lymphatic filtration and weakened antigen presentation. The lymphatic system's ability to monitor for pathogens and abnormal (e.g., cancerous) cells is also compromised, resulting in delayed or inadequate immune responses. Over time, key lymphoid organs such as lymph nodes and the thymus may shrink or atrophy, further diminishing immune competence.

Indirectly, prolonged corticosteroid use can also affect lymphatic fluid balance. Immune dysregulation and inflammation caused by chronic exposure may disrupt lymphatic vessel function, leading to subtle but persistent disturbances in fluid homeostasis.

Overall, systemic absorption of corticosteroids from skin-lightening products undermines the immune functions of the lymphatic system, leaving users more vulnerable to infections, impaired immune surveillance, and weakened overall immunity.

6.7. Musculoskeletal system

Steroidal abuse causes steroid induced myopathy and this is because steroids inhibit protein synthesis while increasing protein breakdown through activation of ubiquitin proteasome and lysosomal pathway. It has been proven that steroids preferentially affect type (ii) fast twitch muscles leading to weakness in quick and forceful movement with no inflammation hence distinguishing it from inflammatory myopathies.

In the skeletal system, the subjects often present with fractures (spine, hips, ribs and long bones) in order of severity, avascular necrosis (especially in femoral head) and glucocorticoid induces osteoporosis which is rapid bone loss within 6-12 months. This is because steroids inhibit osteoblast function by promoting their apoptosis which reduces bone formation and impairs bone remodeling. They also enhance osteoclast activity while decreasing intestinal absorption of calcium and renal calcium excretion hence suppressing vitamin D metabolism.

6.8. Respiratory system

Due to the frequent use of corticosteroid in the treatment of respiratory disease, much attention has been drawn towards their local side effects. It is however important to note that systemic corticosteroids also affect the respiratory system in various ways. Firstly, due to their catabolic effects on muscle, they cause decreased protein synthesis and increased protein breakdown in muscle and skeletal muscle atrophy leading to weakening of respiratory muscles. They

also preferentially affect type IIb muscle fibres, which reduce contractile capacity of the diaphragm and respiratory muscles and consequently reducing maximal inspiratory and expiratory pressure. Corticosteroids suppress the immune response by reducing neutrophil function, macrophage activity, lymphocyte proliferation and cytokine production increasing susceptibility to respiratory infections.They also reduce mucociliary clearance indirectly by causing muscle weakness and reducing cough strength and this allows pathogens to colonise lower airways. The mechanisms above cause an increased risk of pneumonia. Systemic corticosteroids can secondarily also impair respiratory function. They can cause osteoporosis leading to vertebral fractures and thoracic cage deformities reducing chest wall compliances. They may cause fluid retention leading to increased risk of pulmonary edema.

6.9. Gastrointestinal system

In the digestive system, patients often present with inflammatory bowel disease, pancreatitis, gastrointestinal bleeding. This is because steroids alter microbiome balance while also altering the gastrointestinal motility as cortisol modulates the enteric nervous system and gut-brain axis. Glucocorticoids reduce prostaglandin synthesis which protects the gastric mucosa therefore patients who have been abusing steroids often are sensitive to non-steroidal anti-inflammatory (NSAIDs) medications and when mixed they may have severe gastritis. A decrease in prostaglandins especially prostaglandin E2 (PGE2) can directly lead to the formation of gastric ulcers through several interconnected mechanisms:

Prostaglandins are lipid compounds that play a critical role in maintaining the integrity of the gastric mucosa. They

- Stimulate mucus and bicarbonate secretion: These substances form a protective barrier against stomach acid.
- Promote mucosal blood flow: Adequate blood supply ensures oxygen delivery and rapid repair of epithelial damage.
- Inhibit gastric acid secretion: Prostaglandins help regulate acid levels to prevent excessive erosion of the stomach lining.
- Support epithelial cell turnover and repair: They enhance healing of minor injuries to the mucosa.

When steroids or NSAIDs inhibit cyclooxygenase (COX) enzymes specially COX-1 they reduce prostaglandin synthesis. This leads to

- Thinner mucus layer and reduced bicarbonate hence less protection from corrosive gastric acid.
- Impaired mucosal blood flow which leads to lower healing and increased vulnerability to injury.
- Unopposed acid secretion that results in higher acidity damages epithelial cells.
- Delayed epithelial regeneration that causes small erosions can progress to ulcers.

6.10. Central nervous system

In the CNS, glucocorticoids exert their effects at hippocampal level and various studies show a correlation between high levels of endogenous cortisol and hippocampal atrophy leading to cerebral damage and cognitive dysfunction. The negative feedback causes activation of hypothalamic-pituitary- adrenal axis by inducing overproduction of cortisol and increasing damage to the brain. Prolonged glucocorticoids primarily affect behaviors, cognition and psychiatry. Studies have shown that chronic intake of corticosteroids can cause sleep disorders characterized by restlessness and insomnia being observed in 73% of cases studied. Chronic prednisolone intake has been associated with steroid euphoria characterized by a reduced sense of anxiety and depression. Recently, high dose or prolonged treatment with high dose corticosteroids has been associated with catatonia, insomnia and abnormal behaviors like silence and stillness. Literature reports cases of corticosteroid induced depression with an incidence of 45%. Mania, psychosis and delirium were also reported with an incidence of 27.8%,13.9% and 10.1% respectively. The mechanism by which this happens is not clear however it is important to note that administration of prednisone is associated with decreased corticotrophin, norepinephrine and beta endorphin in the cerebrospinal fluid. They also induce an increased glutamate release that induces neuronal toxicity when it accumulates. Difficulty in maintaining concentration and poor memory have also been observed in patients after prolonged corticosteroid therapy with neuroimaging studies showing a decrease in hippocampal volume and brain atrophy due to reduced blood to areas responsible for cognitive function.

7. Conclusion

The practice of skin lightening is a global public health concern and is more pronounced among the Somali community. Most people use skin lightening products due to various motivating factors imposed on them by society for example marital preferences by potential suitors. Most of these products contain potent corticosteroids that have dangerous

effects to the users' bodies, other than the dermatological effects. These effects are mostly unknown to the users and they attribute them to other illnesses. This paper has highlighted these effects in an attempt to create awareness and attempt to reduce the usage of these steroid packed products using a campaign against skin lightening products and multidisciplinary approach is; dermatologists, psychiatrists, psychologists, religious leaders and media personalities.

Compliance with ethical standards

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Disclosure of conflict of interest

We acknowledge that all the authors mentioned in this paper have agreed to have the paper published and they agree with the content published in this paper. There is no conflict declared while and after writing the paper. There is no other party involved in this paper apart from the mentioned authors. No granting has been offered while writing this research paper.

Statement of ethical approval

The research paper did not breach any ethical concerns as it did not involve any interventional procedures. The subjects who filled in the form were clearly informed that the questions asked and their answers obtained will be used for research and educational purposes. There has been no disclosure of subject's personal information.

Statement of Informed Consent

The google form that was used for data collection had an introduction which clearly stated the names of the core investigators, the purpose of the study and that the information obtained from the google form will only be used for research and educational purposes. Find attached below the introduction:

"We are a team of fifth-year medical students—Salma S., Atemel I., Nicholas K., and Nicole W.—conducting a research study on the use and effects of skin lightening products. Our goal is to better understand the health, psychological, and social impacts of these products, especially in cases where their use may be harmful or excessive. This research is driven by our shared passion for public health and our commitment to promoting safer practices and informed choices within our communities. Your participation is entirely voluntary, and you may skip any question or exit the form at any time. No personal information such as your name, email, or contact details will be collected, and all responses will remain completely anonymous. The data you provide will be used solely for academic and public health research purposes. By sharing your experiences, you'll be helping us identify meaningful solutions and contribute to future education, advocacy, and support strategies. Thank you for your time and trust."

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