"The Unfair Drive to be Fair" -

Psychosocial Aspects and Implications of the Use of Skin Lightening Agents

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Abstract:

The quest to be fair is not a concept of the new world. For centuries untold, having a lighter skin tone has been considered as a trait of beauty and supremacy. Society implicates fairness as a factor for getting a prospective life partner. Media portrays fair skin tone as a predecessor for success. These subtle influences affect young minds and drive them towards wanting fair skin. Physicians observe that it is one of the most common forms of body dysmorphic disorder. This article aims to highlight the psychosocial factors that mold this mentality and the possible ill effects it can have on a person, both psychologically as well as physically.

Keywords : *fair, skin lightening products, bleaching, OTC*

Introduction:

A brief overview of history gives us innumerable instances of racial discrimination. White races have since long been considered as supreme while Black races labelled inferior and subjected to slavery. An example of this Apartheid society is the Colored Labor Preference Act of 1955. This Act provided lighter skinned individuals better job options and higher pay-scale amongst other opportunities.[1] Media often advertises fair skin to be more attractive and beautiful. Fair skin is portrayed as a necessary means to become successful. [2,3] All these factors have been deeply embedded in our psyche. Although women are more affected, over the recent years, men too have become obsessed with attaining fairer skin. The degree to which an individual is affected is

also variable. Frequent obsessive thoughts and preoccupation with their skin tone can lead to significant distress and affect their personal and professional life.[4]

Lack of strict regulations on the contents of skin lightening creams have led to them being easily available over the counter (OTC). There is also lack of awareness among people about the potential side effects that these agents can cause when they are used over a long period of time. Most seek help from a dermatologist only after developing significant skin damage.[2,3]

In this article we will discuss in detail about the prevalence of this problem, various skin lightening agents available and their adverse effects, challenges faced, and its psychosocial implications emphasizing on the need to reverse this belief that only fair is beautiful.

Prevalence of skin bleaching:

The use of skin lightening agents has been reported from all across the globe, with the prevalence being highest in Africa and Asia. This may be due to various reasons like the ingrained notion of fair skin associated with beauty, cultural perception and influence of media. In a meta-analysis that was conducted, the life time prevalence of the practice of skin bleaching was estimated to be 27.7%.[5,6]

Skin bleaching was found to be more common in women (43.8%) than in men (35.2%), and in younger age group i.e <30years (56.9%) compared to 25.9% in age group of 30-49years and 6.1% in those aged >60years. It was more common amongst urban population (74.9%) than rural (20.5%). The most commonly abused bleaching agent was found to be topical corticosteroids (73.5%) followed by hydroquinone (53.2%), mercury (34.4%) and a combination of other chemicals (54%).[5]

Despite strict regulations and public health campaigns against the use of skin bleaching agents, prevalence of its use in a study done from 2010-2017[7] continued to be high- 26.8%. This may be due to the fact that these agents continue to be marketed using misleading names like skin brighteners, skin toners, or dark spot removal creams which are easily available OTC. Also

patients who are prescribed skin lightening agents by dermatologists for underlying hyperpigmentary disorders, may misuse the product to bleach their normal skin.[7]

Treatment methods employed by patients

Skin lightening agents range from injections, tablets and the most frequently abused agent-topicals. A wide range of topical skin lightening agents are available, which may be either synthetically prepared or natural derivatives. Most of the topicals contain a combination of various bleaching agents.

Depending on their mechanism of action, skin lightening agents may be classified into the following groups (Table 1).[8]

1. Tyrosinase inhibitors

Hydroquinone

Hydroquinone (HQ) is a phenol derivative, with the chemical structure of 1,4 dihydroxybenzene. It acts by inhibiting the enzyme tyrosinase, the key enzyme in melanin synthesis. It also alters the formation of melanosomes, thus reducing melanocyte synthesis.[9] Till date, it is considered to be the gold standard for treatment of hyperpigmentation. Due to its high potency and easy availability OTC, it was the most abused agent for skin lightening either individually or in combination with other agents.

Although highly potent, hydroquinone poses considerable side effects while used over a long period of time. Upto 2% HQ is still available in certain OTC formulations, and above 2% HQ on prescription. Due to its efficacy, it tends to be abused by those who are unaware of its potential complications. One such complication is irreversible depigmentation. It is very difficult to formulate a stable topical preparation of hydroquinone as it is rapidly oxidized to p-

benzoquinone and hydroxybenzoquinone. These byproducts are toxic to melanocytes leading to depigmentation.[10]

Another dreaded side effect of chronic use is ochronosis. This occurs due to the breakdown of collagen and elastin fibres and deposition of an ochre pigment in the dermis giving the skin a bluish black hue. In advanced stages the skin becomes course and develops caviar like papulonodules. Most frequently the sun exposed areas are affected.[8,11]

An in vitro study showed an increased risk of cutaneous and systemic malignancies in mice who received oral hydroquinone. However, there is not much evidence to support its carcinogenic potential on topical use.[12]

Other side effects include allergic and irritant contact dermatitis, impaired wound healing, discoloration of nails and sclera, loss of elasticity of affected skin and pigmented colloid milia.[11]

In a study done on adult female mice, aloe vera was found to reduce the harmful topical side effects of hydroquinone.[13]

Mercury

Mercury and its derivatives competitively inhibit the copper ions in tyrosinase and hence halt melanin synthesis.[8] It is a common content of skin lightening creams, lipsticks and other cosmetics. Due to its high rate of systemic absorption leading to serious complications, it has been banned in most countries. However, it's unlicensed sale with mislabeling of product continues to pose a threat to consumers.[14,15] The current USFDA permitted levels is <1ppm.[16,17]

Cutaneous side effects of mercury include paradoxical hyperpigmentation and discolored, fragile nails. Acute toxicity due to inhalation of fumes or ingestion are pneumonitis and gastric disturbance. Chronic systemic absorption can lead to glomerulonephritis and nephrotic syndrome.[18]

Arbutin

In a bid to find a safer alternative to hydroquinone, research led to the discovery of arbutin. Arbutin, a natural derivative of hydroquinone, is obtained from the dried leaves of various plants like bearberry, blueberry and cranberry. It acts by inhibition of tyrosinase as well as inhibition of melanosome maturation. It is currently one of the most common ingredients in skin lightening creams worldwide. While higher concentrations are associated with better skin lightening effects, it is also associated with a greater risk of paradoxical hyperpigmentation.[19]
Deoxyarbutin, a synthetic derivative of arbutin, has potent skin lightening and antioxidant properties and lesser melanosome cytotoxicity compared to hydroquinone.[20]

Azelaic acid

Azelaic acid is a natural compound that is produced by the fermentation of wheat, rye and barley by the yeast pityriasporum ovale. It inhibits tyrosinase as well as melanocyte proliferation. Azelaic acid also acts as an anti-oxidant by inhibiting the release of reactive oxygen species. Side effects are usually mild and include- irritation, pruritis and erythema.[19,21]

Kojic acid

Kojic acid is the 2nd most popular OTC bleaching agent, produced by Acinetobacter and Aspergillus group of fungi. It inhibits tyrosinase enzyme as well as possesses anti-oxidant properties. It is often used in combination with other bleaching agents. Although a safer alternative to hydroquinone for long term use, it is unstable and hence can lead to irritation and contact dermatitis. It has also been found to be mutagenic in certain in vitro studies.[8,10,19]

2. Increase epidermal turnover rate

Retinoids

Retinoids are vitamin A analogues that are often used in combination with other agents like hydroquinone and/or steroids, either to facilitate their penetration or to reduce their side effects.

It has various modes of action- inhibits tyrosinase, interferes with melanin transfer to keratinocytes and accelerates pigment loss by increasing the epidermal turnover rate. It often causes irritant reactions like erythema and desquamation and sometimes can lead to paradoxical hyperpigmentation. The most common retinoids used in skin lightening creams are tretinoin and tazarotene.[22,23]

Hydroxy acids

Alfa hydroxy acids act by reducing the cohesion between corneocytes thus causing desquamation. The most common hydroxy acids used for skin lightening are glycolic, lactic, salicylic and citric acid. They are most often used in combination with other skin lightening agents. In lower concentration, they are available as OTC creams. Higher concentrations are used in cosmetology as peeling agents. The side effects include irritation, redness, and paradoxical hyperpigmentation if strict sun protective measures are not undertaken.[24,25]

3. Inhibit melanosome transfer

Niacinamide

Niacinamide is the active form of niacin/vitamin B3. In addition to its anti-oxidant properties, niacinamide inhibits the interaction and transfer of melanosomes from melanocytes to keratinocytes. A study done to test the efficacy of a combination cream containing niacinamide, panthenol and Vitamin E showed significant improvement in skin texture and hyperpigmentation in test subjects in 10weeks. Side effects reported were mild-most commonly a transient burning sensation.[26]

4. Anti-inflammatory

Topical corticosteroids

Topical corticosteroids (TCS) either alone or in combination, are the most abused topical preparations for skin lightening due to its easy availability OTC, affordability and quick results. Its hypopigmenting action is due to its vasoconstrictor properties in the earlier stages whereas chronic use leads to inhibition of melanogenesis. TCS abuse has a wide range of complications both local as well as systemic. Local side effects due to chronic use include hypertrichosis, striae, telangiectasias, skin atrophy, acneiform eruptions and increased risk of fungal infections. If potent steroids are applied over a large surface area for a long period of time, systemic absorption can lead to Cushing's syndrome, diabetes, hypertension, immunosuppression and adrenal insufficiency.[11,14]

5. Anti-oxidant

Glutathione

Glutathione is a tripeptide that is synthesized intracellularly and consists of glycine, glutamate and L-cysteine. It functions as a redox buffer and a neuromodulator.[27] It's skin lightening properties was an accidental discovery, after which its popularity rapidly rose with topical as well as systemic forms entering the market. The proposed mechanism of skin lightening is due to its inhibition of tyrosinase enzyme; causing a switch from eumelanin to pheomelanin, and its role as an anti-oxidant.[28] It is available as injections, tablets, creams and soap. However, there is insufficient data regarding its safety, dose and duration of use. There is also concern regarding the risk of transmission of blood borne infections when IV glutathione is administered by untrained professionals. [29]

Vitamin C

Vitamin C is a tyrosinase inhibitor, reduces oxidative stress during melanin formation as well as deactivates UV induced free radicals thereby acting as a photoprotective agent. Natural vitamin C is unstable, hence used as magnesium ascorbyl phosphate and ascorbyl-6-palmitate which also have better absorption owing to their lipophilic nature.[19] It is usually combined with soy and licorice extracts to make mild and safe skin lightening agents.[10] Side effects are rare and it is used in concentrations of 4-20% in cosmetics sold OTC.

Vitamin E

Vitamin E exerts skin lightening effects by inhibiting tyrosinase, interfering with lipid peroxidation of melanocyte membranes and also by increasing the intracellular glutathione content. It is a mild skin lightening agent, often used in combination with Vitamin C. Side effects are rare.[30]

6. Others

Tranexamic acid

Tranexamic acid, a plasmin inhibitor, has shown considerable promise in the treatment of melasma both in its oral and topical form. Although its exact mechanism of action as a hypopigmenting agent remains unclear, it is believed to interfere with melanin synthesis by inhibition of tyrosinase enzyme and interference of interaction between melanocytes and keratinocytes.[31] It is a common skin lightening agent that is prescribed by dermatologists for the treatment of melasma. However, some patients may continue to use it unsupervised, even on their normal skin, in a bid to experience its skin lightening effects.[32]

Challenges

Due to the complex interplay of ingrained beliefs, social pressure and the role of mass media propaganda, it is a great challenge to address this issue of skin lightening abuse. The unregulated licensing of harmful chemicals in cosmeceuticals coupled with their easy availability OTC, adds to the existing problem.

A study was done to assess the knowledge, attitude and practice (KAP) of skin lightening treatments amongst 3259 university students in 5 south east Asian countries.[33] The prevalence of use of skin lightening products (SLP) was around 40.5% overall, and it varied among different countries. The use of SLP was significantly more in females. 79.1% were aware of the harmful effects of SLP and 30.1% knew the active ingredients. Majority of the participants ($3/4^{th}$) considered lighter skin tone to be more beautiful, whereas around $2/3^{rd}$ felt that society associated fair skin with beauty. They also believed that advertising SLPs on mass media communication had a vital role to play in shaping one's outlook towards fair skin.[34] This study also pointed out that knowledge about the active ingredients and side effects of SLPs did not prevent participants from using it. Also, use of SLP was not restricted to darker skin types; even those with fair skin wanted their skin to appear more fair.[33]

In another cross-sectional study of 406 patients with cutaneous hyperpigmentation in the United States, majority obtained SLP from pharmacies on a prescription basis compared to OTC. This indicates that dermatologists are provided an opportunity to counsel such patients regarding the harmful effects of long-term use of SLP.[35] Since OTC products are easily accessible and widely advertised, there is a general consensus that they are safe and free from side effects.[36,37] There also exists a misconception that more expensive cosmeceuticals are free from harmful chemicals.[38]

A study from India reports that skin fairness industry has a net worth of $ 450-535 million, strongly associated with ancient cultural notions of beauty, higher social status and better job and marital prospects. Around 17% of the study population reported experiencing side effects.[39]

While SLPs were mainly advertised for women earlier, a wide range of products are now available in the market specifically for men. Also, well known celebrities advertising use of such products have increased its appeal.[40]

In order to control this menace of skin lightening abuse and its side effects, certain harmful chemicals like mercury and arsenic were banned. In certain countries, only up to 2% hydroquinone is allowed in OTC SLPs, higher concentrations requiring prescription from a medical practitioner. Despite these regulations, research has found these chemicals above permissible limits in SLPs. A reason for this may be due to mislabeling and lack of strict screening, as cosmetics are not bound by law to list all their ingredients.[41]

Current trends in the use of skin lightening agents

Although there is considerable awareness in the present times about the ill effects of skin lightening agents, it continues to occupy a major share in the cosmetic market. People seek safer and faster alternatives for the same rather than abandoning the practice. Recent years saw a sharp rise in the use of glutathione, as an injectible, oral as well as topical formulation. Its popularity rose rapidly due to its quick and drastic skin bleaching effect. However, it has been banned in several countries due to lack of clinical data regarding its long term safety profile.[27,29,42]

Psychosocial aspects of skin lightening

In order to understand why the use of skin lightening creams is so widespread, we need to analyze what drives a person to prefer fairer skin. To a large extent, our perception of what is beautiful is shaped by what we see on mass media and what is acceptable in society.

Decades of colonial rule in different parts of the World particularly in Asia and Africa shaped people's mindset that fair skin is associated with higher social status, wealth and prosperity. It set

up a racial hierarchy stratifying society based on their skin color.[43,44] Fair skin is also believed to be associated with better job and marital prospects.[33] Social media often reinforces this belief, advertising use of fairness creams as a means of achieving success.[45]

The 'biopsychosocial model' explains that a person's condition is not simply determined by biological factors, but also psychological and social factors.[46] When we apply this model in case of skin lightening abuse, the biological factor is the inherent skin color with which we are born with. Psychologically, it is how these patients display their thoughts, emotions and behaviors such as psychological distress, fear, avoidance, beliefs and how they cope with this distress. Social factor includes societal pressures and work environment which play a vital role in the overall presentation of these patients to physicians.

The 'objectification theory' discusses the social aspect of this problem.[47] Man is a social animal. Our skin is not just an organ of our body, it is the largest form of expression and identity of oneself. Any form of alteration of the skin, be it with skin lightening treatments, tanning, tattooing or piercing gives a person a sense of belonging to a community.[1] How a person views oneself is largely shaped by the opinion of others. This in turn leads to 'self-objectification', a significant factor associated with body shame, low self-esteem and in general, poor well-being.[48–50] Previous studies support this association, where individuals with impaired mental health were found to be more likely to use skin lightening treatments.[33,51] It was also found that such individuals indulged in more aggressive and risky forms of skin lightening practices, and thereby were more prone to develop side effects.[52] Another study done to investigate the motivation behind the practice of skin bleaching in Tanzania, proved the self-objectification theory, where the participants admitted to its use in order to satisfy their partner and/or their peers. Also, they reported using SLPs to look more beautiful/attractive, an unachievable standard that is set by the outside world, and not created from within.[53]

Conclusion

This study aims to highlight the multifaceted problems associated with the use of skin lightening treatments. It is clear that this issue cannot be handled by just imposing a ban on skin lightening products. Understanding the root cause of this problem and following a wholesome approach in management is of pivotal importance. In addition to more strict regulations on the marketing and sale of SLPs, a change in attitude towards accepting all colors of skin is the need of the hour. Patient and parent education through social programs should aim to promote positive body image and strengthen one's self esteem so as to obviate the preventable social and emotional consequences.

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Table 1

Mechanism	Skin lightening agents
Inhibition of tyrosinase enzyme	Hydroquinone, mercury, arbutin, azelaic acid, kojic acid
Increase epidermal turnover rate	Retinoids, alfa and beta hydroxyl acid derivatives
Inhibit melanosome transfer	Niacinamide
Anti-inflammatory	Topical corticosteroids
Anti-oxidants	Glutathione, vitamin C, vitamin E
Others	Tranexamic acid