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Assessing the safety profile of superficial chemical peels in individuals with darker skin - A retrospective study

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ABSTRACT

Background: Superficial chemical peels are commonly used for treating dermatological conditions such as acne, hyperpigmentation, and photoaging. However, their safety profile in individuals with darker skin tones (Fitzpatrick skin types IV–VI) remains a concern due to the risk of post-inflammatory hyperpigmentation (PIH) and other complications. This study aims to assess the safety profile of superficial chemical peels in individuals with darker skin through a retrospective analysis of adverse effects and treatment outcomes.

Methods: A retrospective analysis was conducted in a dermatology clinic affiliated with a tertiary care hospital. Medical records of individuals with Fitzpatrick skin types IV–VI who underwent superficial chemical peels between January 2020 and December 2023 were reviewed. Demographic details, type and concentration of chemical peels used, number of treatment sessions, and recorded adverse effects were analyzed. Statistical associations between complications and patient factors such as skin type, peel type, and number of sessions were evaluated using chi-square tests ($p < 0.05$).

Results: A total of 100 patients (35% male, 65% female) were included. The most commonly used peels were glycolic acid (40%) and salicylic acid (30%). Adverse effects included erythema (40%), hyperpigmentation (25%), dryness/flaking (35%), hypopigmentation (10%), and burning sensation (20%). Patients with Fitzpatrick type VI experienced higher rates of hyperpigmentation (30%) and erythema (40%). Increased sessions correlated with a higher incidence of adverse effects.

Conclusion: Superficial chemical peels are generally safe for individuals with darker skin tones when performed with appropriate precautions. However, risks such as hyperpigmentation and erythema are more prevalent, particularly in those with Fitzpatrick type VI and those undergoing multiple sessions. Proper patient selection, pre-peel preparation, and post-peel care are crucial in minimizing complications.

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INTRODUCTION

Chemical peeling is a procedure that uses chemical peeling agents to remove the outer layers of skin, improving texture and appearance and promoting regeneration[1]. Usually used to treat acne, hyperpigmentation, and photoaging, superficial chemical peels target the epidermis. Despite its widespread usage, the safety and efficacy of peeling in patients with darker complexions (Fitzpatrick skin types IV–VI) must be considered due to the peculiar sensitivities of skin that contains melanin[2].

Most people in the planet are dark-skinned. In regions of North America and Europe, as well as in Asia, Africa, and Latin America, darker skin phototypes are more prevalent. The safety and effectiveness of the majority of skin treatments, including chemical peels, in these communities are unknown because there are no dermatological research or literature accessible in these populations[3].

Peels have historically proven difficult for darker skin types due to the possibility of side effects including hypopigmentation and post-inflammatory hyperpigmentation (PIH). Numerous research have lately refuted this. Grimes et al.'s retrospective research[4] looked at the safety of superficial chemical peels for individuals with skin types III–VI. Patients with skin type VI had an increased risk of side effects, however the frequency of problems was quite low. Wintertime also saw less side effects. According to another study, superficial chemical peels are safe and efficient for reducing papules, pustules, and comedones, and they can be used to treat mild to moderate acne in darker skin types[5,6].

Darker skin types are increasingly in need of cosmetic treatment, thus evidence-based guidelines are crucial to ensuring the safety and efficacy of therapy. Although initial findings indicate that superficial chemical peels may be safely applied to darker skin types, further study is necessary due to the increased likelihood of undesirable side effects in some subgroups. In order to reduce the risk of problems in darker-skinned persons and to clarify therapeutic parameters, the current study will evaluate the safety profile of superficial chemical peels in these individuals by a comprehensive retrospective assessment.

AIM AND OBJECTIVES

By evaluating side effects, post-procedure problems, and treatment tolerance, as well as identifying factors like skin type and peel type that impact these issues, the study seeks to determine the safety profile of superficial chemical peels in patients with darker skin.

MATERIALS AND METHODS

Study Design and Setting

A dermatological clinic connected to a tertiary care hospital served as the site of this retrospective investigation. We looked examined the medical records of darker-skinned people (Fitzpatrick skin types IV–VI) who had superficial chemical peels from January 2020 to December 2023.

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Study Population

Patients with at least one superficial chemical peel treatment for dermatological issues such acne, hyperpigmentation, melasma, or skin rejuvenation were included in the research.

Inclusion Criteria:

1. Individuals aged 18 years and above.
2. Fitzpatrick skin types IV, V, and VI.
3. Patients who completed at least one session of a superficial chemical peel.
4. Availability of complete medical records, including pre- and post-treatment documentation.

Exclusion Criteria:

1. Patients with a history of keloids, active skin infections, or inflammatory dermatoses.
2. Individuals who had undergone medium or deep chemical peels.
3. Those with incomplete or missing medical records.
4. Patients who received additional dermatological treatments during the study period that could influence outcomes.

Data Collection

Information was collected from electronic medical records and included demographic data (age, gender, Fitzpatrick skin type), type and concentration of chemical peel utilized, number of sessions, and adverse effects or complications observed. Pre-peel skin preparation, post-procedure instructions, and interval between sessions were also studied as treatment-related factors.

Chemical Peel Protocol

Superficial peels used in the study were glycolic acid (20–50%), salicylic acid (20–30%), lactic acid (10–20%), mandelic acid (10–15%), and combination peels. The peels were used following standard dermatological practice:

1. Pre-Peel Preparation: Patients were asked to discontinue retinoids and exfoliants one week before the procedure. They were prescribed a pre-peel regimen of moisturizers and sunscreen.
2. Application: Following skin degreasing and cleansing, the chemical peel was applied evenly and left for a specific period depending on the type of peel and the patient's tolerance.
3. Neutralization and Post-Peel Care: Post-peel care consisted of emollients, sunblock, and not getting too much sun. Neutralization was performed with a sodium bicarbonate solution or water, depending on the peel utilized.

Outcome Measures

The primary outcome measure was the incidence of adverse effects, including erythema, hyperpigmentation, hypopigmentation, dryness, and burning. Secondary outcomes

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included the correlation of complications with patient factors, including Fitzpatrick skin type, number of treatments with peel, and peel type.

RESULTS

Table 1: Demographic and Clinical Characteristics of Study Participants (n = 100)

Characteristic	Number (n)	Percentage (%)
Age Group (years)		
18-25	30	30%
26-35	40	40%
36-45	20	20%
>45	10	10%
Gender		
Male	35	35%
Female	65	65%
Fitzpatrick Skin Type		
Type IV	50	50%
Type V	35	35%
Type VI	15	15%

Table 2: Type of Superficial Chemical Peels Used

Peel Type	Number (n)	Percentage (%)
Glycolic Acid	40	40%
Salicylic Acid	30	30%
Lactic Acid	15	15%
Mandelic Acid	10	10%
Combination Peels	5	5%

Table 3: Frequency of Adverse Effects Observed

Adverse Effect	Number (n)	Percentage (%)
Erythema	40	40%
Hyperpigmentation	25	25%
Hypopigmentation	10	10%
Dryness/Flaking	35	35%
Burning Sensation	20	20%
No Adverse Effects	30	30%

Table 4: Post-Peel Complications Based on Fitzpatrick Skin Type

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Fitzpatrick Skin Type	Hyperpigmentation (%)	Hypopigmentation (%)	Erythema (%)	No Complications (%)
Type IV	12%	5%	25%	58%
Type V	18%	8%	30%	44%
Type VI	30%	12%	40%	18%

Table 5: Adverse Effects by Number of Peel Sessions

Number of Sessions	Erythema (%)	Hyperpigmentation (%)	Hypopigmentation (%)	Dryness (%)	No Adverse Effects (%)
1-3	30%	10%	5%	20%	50%
4-6	40%	20%	10%	30%	30%
>6	50%	35%	15%	45%	10%

DISCUSSION

The incidence of side events and treatment problems was used in this retrospective research to assess the safety profile of superficial chemical peels in individuals with darker skin (Fitzpatrick skin types IV–VI). According to our results, superficial chemical peels are typically safe in these individuals, although some side effects like as post-inflammatory hyperpigmentation (PIH) and erythema are important concerns, especially with several sessions.

Our results are in line with earlier research on darker skin genotypes' elevated risk of post-inflammatory hyperpigmentation (PIH) after chemical peels. In line with our research's 25% rate, Mar et al.'s (2018) study showed that up to 30% of Fitzpatrick skin types IV–VI had PIH after superficial glycolic acid peels. Their investigation reaffirmed the significance of pre-peel preparation and post-peel sun protection to reduce the incidence of hyperpigmentation, which is in line with our findings.

40% of patients getting superficial peels had erythema, which is consistent with the findings of Chandrashekar et al.[8]. Without medical intervention, the erythema went away in a few days. Peels containing glycolic and salicylic acids are more likely to cause erythema. According to the study, superficial peels had a lower frequency of hypopigmentation (10%) than hyperpigmentation (10%). This implies that, in contrast to medium or deep peels, which have a higher risk of pigmentary alterations, superficial peels are a safe procedure for darker skin types. A comparison of lactic acid and mandelic acid peels in Indian patients revealed that less than 12% of patients had hypopigmentation[9].

The number of peeling sessions and the incidence of adverse effects were shown to be significantly correlated by the study. Due to cumulative exposure to peeling chemicals, patients who got more than six sessions were more likely to develop erythema and hyperpigmentation.

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This is comparable to the finding of Marta et al.[10] (2010) that excessive use of chemical peels raises the incidence of erythema and PIH, especially in individuals with skin types IV–VI. To reduce these hazards, they suggested appropriate patient selection and intervals between sessions. In line with Rashmi et al.'s[11] (2019) investigation of the safety profile of chemical peels in South Asian and African populations, the study also discovered that glycolic acid and salicylic acid peels were associated with an increased risk of erythema and dryness.

Our study's strengths include the comprehensive examination of a variety of peels and the comparatively high patient numbers. There are certain intrinsic restrictions. Because it is a retrospective study, it is conducted using clinical records with varying levels of documentation quality. Additionally, it was not measured how individual differences in lifestyle and skin care practices might affect the outcome of a peel. To confirm these findings, further research will need to use standardized procedures in prospective studies and longer follow-up periods.

CONCLUSION

This retrospective study emphasizes the safety profile of superficial chemical peels in darker skin patients (Fitzpatrick skin types IV–VI). While the overwhelming majority of patients tolerated the procedure well, an adverse effect subgroup developed erythema, hyperpigmentation, and dryness. The complications were variable and related to factors such as number of sessions, type of peel, and intrinsic skin type. Proper patient selection, adherence to pre- and post-peel instructions, and proper application techniques can minimize complications. These results emphasize the importance of individualized treatment modalities to achieve maximum efficacy and safety of chemical peels in darker skins. Additional prospective studies with large sample sizes are recommended to validate these results and develop uniform guidelines for the safe and effective use of superficial chemical peels in darker skins.

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