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Original Research Article

Comparative evaluation of glycolic acid and salicylic acid peels followed by PRP for treatment of hyperpigmentation-A split face study

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ABSTRACT

Introduction: Hyperpigmentation is a medical term used to describe darker patches of skin from excess melanin production. This can be caused by everything from acne scars and sun damage to hormone fluctuations. The first-line treatment for hyperpigmentation involves topical formulations of conventional agents such as hydroquinone, kojic acid, and glycolic acid followed by oral formulations of therapeutic agents such as transexamic acid, melatonin, and cysteamine hydrochloride. Despite the availability of multiple treatments for the condition, hyperpigmentation continues to present clinical management challenges for dermatologists. The study aims to compare the therapeutic efficacy, to compare the therapeutic efficacy and tolerability of glycolic acid peels and salicylic acid peels for hyperpigmentation treatment.

Materials and Methods: 200 patients were selected and graded on Fitzpatrick scale. A split face peel on right side by Glycolic Acid and left side by Salicylic Acid was done and procedure was repeated after 2 week and then third sitting of PRP was done. Patients were scaled on Fitzpatrick scale at baseline and after 3 sitting (PRP).

Result: Salicylic recorded a mean value of 3.10 at baseline while glycolic acid recorded 2.92 at baseline. After 3 sitting Salicylic Acid recorded a mean reduction value of 0.29 while that of Glycolic Acid mean reduction value was 0.71and this was stastically significant reduction.

Conclusion: Patients with Salicylic Acid peels showed significantly better response than Glycolic Acid peels.

1. Introduction

Skin hyperpigmentation is a common dermatological condition in which the skin color generally becomes darker. Various internal and external factors including hormonal changes, inflammation, injury, acne, eczema, certain medication, UV exposure, etc influence skin color. (Perez-Bernal et al., 2000). Melanin is a skin pigment produced by melanocytes in various layers of skin,affecting skin pigmentation and coloration. Thus, skin hyperpigmentation disorder is result of alterations in melanocyte production or distribution of melanin (Rossi & Perez, 2011).[1] Various commonly observed hyperpigmentation disorders include melasma, post-inflammatory hyperpigmentation, ephelides, lentigines, and many more. Skin condition in which irregular patches of light to dark brown or gray–brown lesions appear on the sun exposed parts of the skin indicating to acquired hypermelanosis of skin, a condition which refers to Melasma (Katsambas & Antoniou, 1995;[2] Victor et al., 2004). It usually affects the face and the neck regions and predominantly observed in women (Handel et al., 2014).[3]

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Hyperpigmentation is not considered a harmful or lethal disorder; however, it affects patients emotional and psychological health and it does exert influence on quality of life. Various treatment options are available for hyperpigmentation. These agents are primarily applied by topical route in the form of creams, gels, or ointments. These topical treatments can have some side effects such as skin drying, irritation, peeling, or hypopigmentation. Poor patient compliance and satisfaction can be observed in prolonged durations of treatment ranging for several months. The challenge of effective therapy to treat hyperpigmentation remains unresolved that lays emphasis on the need for novel treatment options.

Salicylic acid, a beta-hydroxy acid though traditionally used for acne, has also been tried in pigmentary disorders like melasma. Dark-skinned individuals including acne, melasma and postinflammatory hyperpigmentation, ethanol solutions of salicylic acid are excellent peeling agents in these conditions. The mechanism of action of salicylic acid is slightly different from that of glycolic acid peels in decreasing pigmentation. Salicylic acid is anti-inflammatory and thus it also serves to decrease the postinflammatory hyperpigmentation which usually follows the use of peeling agents on the skin. In addition, it has a diffuse whitening effect on the skin as shown in a study by Ahn and Kim.[4] In a pilot study by Grimes et al.[5] on dark-skinned individuals, 20-30% salicylic acid peel was used to treat acne, postinflammatory hyperpigmentation and melasma, and it was observed that almost two-thirds of the patients with melasma showed a moderate improvement. Only mild side effects were noted in 16% patients which were transient and resolved in one to two weeks. However, as there are no comparative studies, it is difficult to comment if the agent is better or inferior to the traditional glycolic peels.

Glycolic acid peel has the smallest molecular weight amongst all the alpha-hydroxy acids. It penetrates skin easily, making it a popular peel agent.[6] Glycolic acid has two carbon atoms: one carbon atom is with a carboxyl group and the other carbon atom is with a hydroxyl group. Glycolic acid is extremely hydrophilic. The pH of a non-buffered solution ranges from 0.08–2.75.[7] Previous authors have recommended the use of a buffered or partially neutralized glycolic acid, which is safer than free Glycolic acid.[8] Glycolic acid peels are commercially available as free acids, partially neutralized (higher pH), buffered, or esterified solutions.[9] They are available in various concentrations ranging from 20%–70%. The higher the concentration and lower the pH, the more intense the peeling will be.[10] In general, gel formulations have a slower penetration time and are easier to control.[11,12]

Our study thus focuses on the therapeutic targets as well the various , novel and emerging therapies being approached for the better, effective, and timely management of hyperpigmentation by using the most potent chemical agents glycolic & salicylic acid were used followed by PRP therapy for pigmentation.

2. Materials and Methods

2.1. Study design and settings

The study was conducted at the Department of Periodontology and Oral Implantology, I.T.S. Center for Dental Studies and Research, Muradnagar, Ghaziabad from May 2021 to October 2021.

2.2. Sample size

A total of 200 patients of both the sex with acne scars, hyperpigmentation were included for the above study. The study was split face comparative observational study.

2.3. Inclusion criteria

1. Patients of both sex with acne scars or hyperpigmentation.
2. Age between 20 to 60 years.
3. Patients with lesions limited to face only.
4. Patients with hyperpigmented areas on their face only.

2.4. Exclusion criteria

1. Patients taking any acne-inducing drugs.
2. Patients with hormonal acne (patient with known h/o PCOD, menstrual irregularities and patient on hormonal therapy for acne.
3. Patients with active/recurrent herpes infection.
4. Patients with a history of hypertrophic scarring/keloid.
5. Patients with hypersensitivity to aspirin.
6. Patients with oral isotretinoin intake in the past 6 months.
7. Pregnant and lactating women.

2.5. Treatment protocol and methodology

Pre_treatment assessment-Patients selected were informed of the nature of the study and written consent was obtained from the patients. The Demographic data such as age and sex of the selected patients, and duration of the disease were taken. Other history, like family history of acne, use of cosmetics, treatment history like topical and oral treatment for acne, topical steroids and other precipitating factors such as home remedies (mud, curd, honey etc.) were noted.

Patients were categorized according to Fitzpatrick index.

2.6. Methods

Patient reported to the Department of Periodontology and Oral Implantology, I.T.S. Center for Dental Studies and Research, Muradnagar.

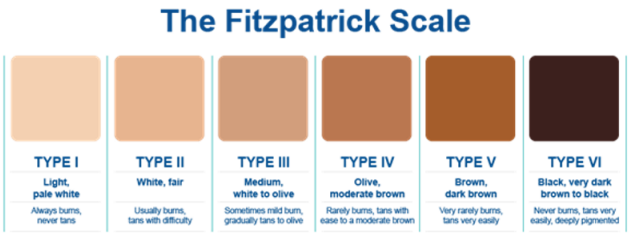


Fig. 1: Showsfitzpatrick index, Type I-Type VI.

A total of 200 patients of both the sex with different types of pigmentation were selected according to Fitzpatrick scale ranging from I-VI and enrolled for the study.

Thereafter study procedure was explained and written consent was taken from the patient and then they were seated on the dental chair.

Preoperative pictures were taken after patient drapes and head cap were placed at the camera setting of 2x, without flash light (chair position 90 degrees, without dental chair light).

2.7. Procedure

Healthy adult patients with pigmentation on their face were encouraged to participate in the study. As the study is split-face, on one side of face 30% Salicylic acid peel was used and on the other side 25% Glycolic acid peel was used.

Before starting the peel, the face was thoroughly cleansed with alcohol and/or acetone to remove oils from the skin followed by marking on the face with a marking pencil diving the face into two equal halves for the split face study. On the right side of the face Glycolic acid was applied and on the left side Salicylic acid was applied. Peels to be used are put separately in pellets and applied carefully on the face with help of the brush.

The peel was then left on for 3–5 minutes and patient were continously moniterd for any discomfort. Patient's face was cleaned with water. A bland cleanser was used to remove any residual precipitate. After rinsing, a bland moisturizer was applied to the skin. Patient was given post-operative instructions and the procedure was repeated again after 2 weeks, twice followed by Platelet Rich Plasma (PRP) THERAPY. Changes in the face were recorded with indices every time the patient came.

Side effects if any, which appeared over the course of therapy were also recorded.

2.8. Postoperative instructions

For 24 to 48hrs patients was instructed

1. Not to wash with soap
2. Wash their skin with cool water rather than warm or hot water
3. Avoid exposure to direct heat or sun or dust

Further instruction were given to

(a) Keep skin lubricated and moisturized
(b) Avoid products that dry the skin
(c) Avoid exfoliators on your skin.
(d) Use sunscreen with an SPF of at least 50
(e) Not pick at blisters or scabs that form on your skin
(f) Not smoke and avoid exposure to secondhand smoke
(g) Avoid cosmetics

Patients were instructed to contact the doctor if they have any uncomfortable symptoms of any kind that don't go away.

2.9. PRP therapy

Before the treatment, 8 ml of blood was collected from the patient into a special tube containing separation gel and anticoagulant Tube was then centrifuged for 8 min at 3500 rpm and PRP was obtained from the upper part of the buffy coat. A 32-G needle was used for superficial microinjections via mesotherapy technique, and injections are administered into the papillary dermis (1.2 – 2 mm deep) then the plasma was spread on your face, after which micro-needling across the forehead and cheeks was done to helps the face absorb proteins . Same post operative instruction were given.

2.10. Clinical parameters

Clinical photographs of the face were taken pre-operatively before peel, 15 days after peel,30 days after peel and 60 days after peel i.e after 30 from prp therapy. Fitzpatrick scale was measured

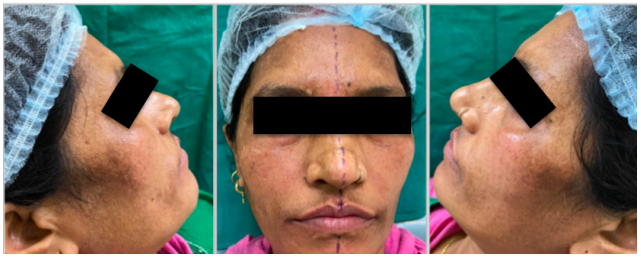


Fig. 2: First appointment preoperative pictures taken after dividing the face in two halves.

3. Result

Total of 200 patients were selected,out of which females outnumbered males in the ratio of 3:1.

Pictorial evaluation showed a good or very good response in (85)% in participants with salicylic acid peels

Table 1: Intergroup comparison of means of Skin hyper pigmentation Index and % Reduction between two time intervals. Between two groups at different time intervals by Independent t-test

	Group	Mean ±Std. Deviation	Mean Difference ±S.E.M.	P Value
Baseline	Salicylic acid	3.100±1.9765	0.1800±0.7633	0.81^{NS}
	Glycolic acid	2.92±1.3855		
After 3 Months	Salicylic acid	.290±.1912	-0.4200±0.1706	0.024*
	Glycolic acid	.710±.5043		
% Reduction	Salicylic acid	86.5896±12.01780	13.088±5.958	0.041*
	Glycolic acid	73.5006±14.51216		

^{NS}Not Significant p >0.05,* Significant p <0.05

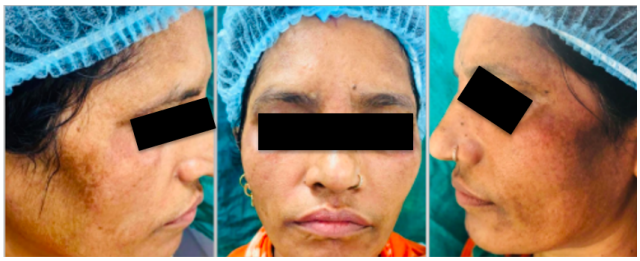


Fig. 3: After 15 days of peel post-operative pictures taken.

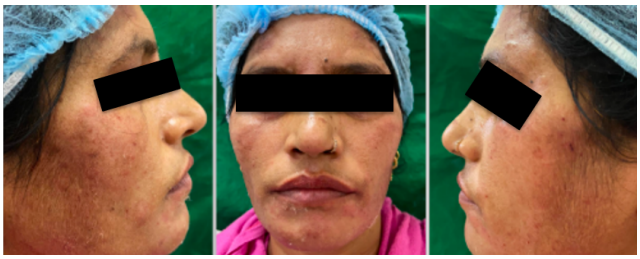


Fig. 4: After 30days post-operative pictures taken from first appointment.

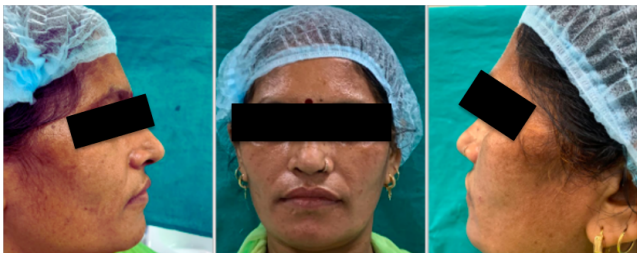


Fig. 5: After 4months post-operative pictures taken from first sitting.

in comparison to glycolic acid peels (70) which was significantly different.

Intergroup assessment showed that reduction of pigmentation with the salicylic acid peel 86.58% and Glycolic acid peel was 73.50% which is significant.

In intragroup assessment the salicylic acid peel which has pre operative value of 3.10 which reduced post operatively to 0.29 showing significant difference while Glycolic acid

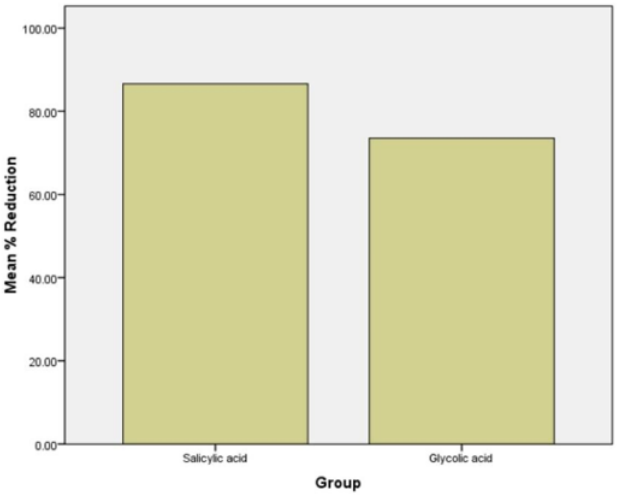
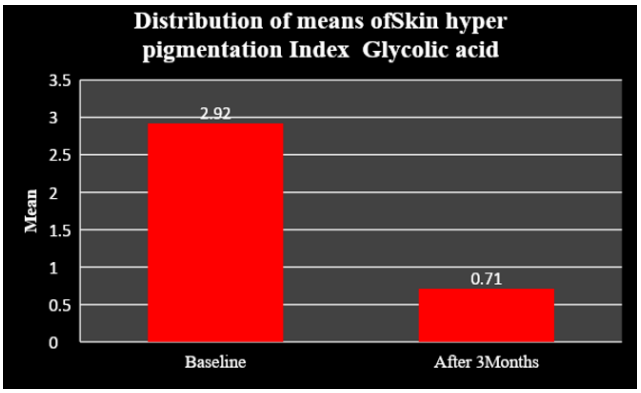


Fig. 6: Comparison of group (salicylic acid & glycolic acid) on x-axis with mean % reduction on y-axis.

peel has pre operative value of 2.92 which reduced post operatively to 0.71 showing significant difference.



Graph 1: Shows distribution of mean of skin hyperpigmentation index of glycolic acid.

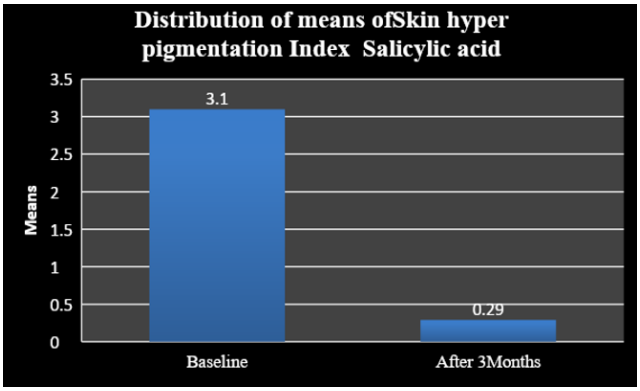
4. Discussion

Melasma is a symmetric progressive hyperpigmentation of the facial skin that occurs in all races but has a

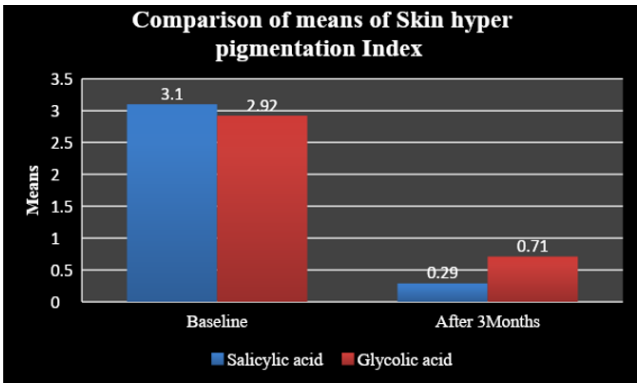
Table 2: Intra group comparison means of Skin hyper pigmentation Index between two time intervals of a group by Paired t-test

		Difference Mean ±Std. Deviation	P value
Salicylic acid	Baseline - After 3 Months	2.8100±1.9958	.002**
Glycolic acid	Baseline - After 3 Months	2.2100±1.1949	.001**

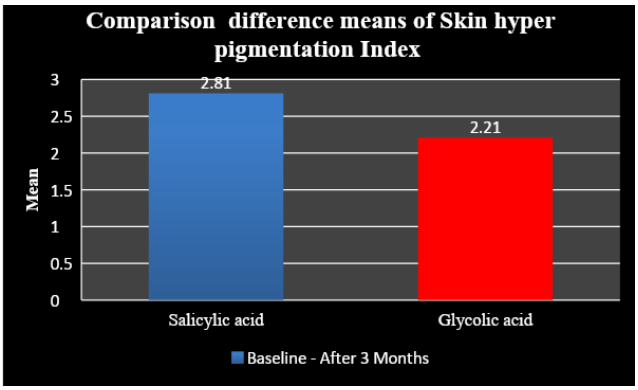
^{NS} Not Significant p >0.05,* Significant p <0.05, ** highly significant p<0.01



Graph 2: Shows distribution of mean of skin hyperpigmentation index of salicylic acid.



Graph 3: Comparison of means of skin hyper pigmentation index.



Graph 4: Comparison of means of skin hyper pigmentation index.

predilection for darker skin phenotypes. Depigmenting agents, laser, and chemical peeling have been used alone and in combination for the treatment of melasma.[13] Melasma has been associated with hormonal imbalance, sun damage, and genetic predisposition.[14]

Clinicians and participants often use chemical peels as an adjunct to medical therapy because they produce complementary rapid therapeutic effects and improvements in skin appearance and texture.[15] Peels may allow topical agents to penetrate more efficiently into the skin and may improve post-inflammatory hyperpigmentation.[16] With good technique, peels are beneficial in dark-skinned participants. Chemical peeling has a low rate of complications and is popular due to the low costs involved and to a technique which is easy to learn.[17]

In a study conducted by Grimes, salicylic acid peel on acne showed an excellent to moderate response in 88% and mild clearance in 12% cases.

Glycolic acid, a member of AHA family is one of the most extensively used and versatile peeling agent, which has been found beneficial in a variety of skin condition including disorders of keratinization (xerosis, ichthyosis) as well as the commonly present skin problems like post inflammatory hyper-pigmentation, melasma, acne, dynamic rhytides, warts, actinic and seborrhoeic keratoses etc.[18] Skin rejuvenation is its most common indication. Burns et al[19] have documented the similar kind of results as obtained in our study in terms of improvement of post inflammatory hyperpigmentation with the use of glycolic acid peels. Wang et al[14] reported 90% improvement of overall acne lesions with glycolic acid and 69% reduction in hyperpigmentation and scarring. Grover C et al[20] reported good response in 78% patients with melasma.

Salicylic acid which is a beta hydroxy acid derivative and it eliminates intracellular lipids that are covalently bonded to the cornified epitheloid cells. 30% concentration is found to be most efficacious when indicated for multiple sessions, 3-5 times, every 3-4 weeks. Similar to our study, a parallel study conducted by Grimes et al[5] concluded that salicylic acid peel on acne and hyperpigmentation yeild excellent to moderate response in 88% and mild clearance in 12% cases. Another study by Fabbrocini et al.[21] illustrated that use of 33% salicylic acid application once for four months resulted in statistically significant reduction in melasma.

Similar to our study, Sarkar et al.[22] compared the efficacy ofglycolic acid (35%) and salicylic-mandelic (SM) acid (20% salicylic/10% mandelic acid) versus

phytic combination peels in Indian patients with melasma. Chemical peeling was done after every 14 days in all groups until 12 weeks. MASI scoring after 12 weeks was 62.36% reduction in GA group, 60.98% reduction in SM group, and 44.71% in phytic acid group.

Age and sex distribution- In our study the maximum number of patients were between 30-50 years of age. With the observation most of them were females with 67% of them being mothers. At the end of the split face therapy, the side treated with salicylic acid showed better results than that treated with glycolic acid. In our study we observed moderate to excellent improvement in hyperpigmentation which were significantly better for salicylic acid than glycolic acid.

Limitation of the study is long term follow up is required is required to assess the efficacy of the chemical peel.

5. Conclusion

Salicylic acid is a safe and efficacious peeling agent for a number of dermatological and cosmetic problems, including acne vulgaris, melasma, photodamage, freckles, and lentigines. It can be safely used in dark skin types.

6. Conflict of Interest

None.

7. Source of Funding

None.

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