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Comparison between beta hydroxy acid chemical peel and intense pulsed light in the treatment of facial acne vulgaris in Asian patients

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Abstract

Background: Although acne is not physically disabling, there is significant demand for effective acne therapies. Chemical peeling is the most widely used procedure in the management of acne and acne scars, but there are very few studies on it. Salicylic acid is beta- hydroxy acid that is an excellent keratolytic agent. Light and lasers appear to reduce inflammatory acne lesions by targeting some of the main pathophysiologic factors. We compared the efficacy of Intense Pulse Light and beta hydroxy peel in treatment of facial acne vulgaris.

Materials and Method: It is a prospective comparative study with convenient sampling done. Twenty patients with facial acne were included in the study. Clinical photograph and grading of acne using Michelson's acne severity index was done. One half of the face was subjected to monotherapy with IPL and patient was started with 1 J less than the most tolerable dose. Fluence increased by 1 J every session. 530 nm filter was used. 30% salicylic acid peel was applied on the other half of face. This procedure was done every 2 weeks for a total of six sessions. Paired t-test was done. IBM SPSS statistics software version 2015 used

Results: Intense pulse light treated side showed 54.4% reduction in acne severity score whereas chemical peeling treated side showed 34.4% reduction. Intense pulse light treated side showed statistically significant improvement. (SD- 3.743, t-value =4.632).

Conclusion: Intense pulse light as a monotherapy showed better results than chemical peeling. Salicylic acid peel has better effect on post-acne hyperpigmentation compared to intense pulse light.

Keywords: Intense Pulse Light, Salicylic acid peel, Acne

Introduction

Although acne is not physically disabling, its psychological impact can be striking, contributing to low self- esteem, depression and anxiety. As a result, there is a significant demand for effective acne therapies. Chemical peeling of the face has been performed for many years. It is a widely used procedure in the management of acne and acne scars, but there are very few studies on Asian populations.[(1)] Salicylic acid is derived from willow bark, wintergreen leaves and sweet birch. In the early 1990's Swine heart reported satisfactory results using 50% salicylic acid on the hands and forearms of patients with actinically induced pigmentary changes.[(2)] Chemical peeling is the application of a chemical agent of defined strength to the skin that causes destruction at the required depth, followed by remodelling without scarring. Salicylic acid is a beta- hydroxy acid that has a phenolic ring in its chemical structure.[(3)] It is an excellent keratolytic agent. It is thought to function through solubilisation of intercellular cement, thereby reducing corneocyte adhesion. Due to its lipophilicity, it has better penetration into the pilosebaceous unit. This property of salicylic acid accounts for its strong comedolytic effect, and its utility in the treatment of acne.[(4)] Salicylic acid affects the arachidonic cascade and thus exhibits anti-inflammatory capabilities.[(5)] Imayama et al concluded that peeling with salicylic acid can lead to alterations in the underlying dermal tissue without directly wounding the skin.[(6)] It does not affect mitotic activity in human epidermal cells.[(7)] Use of salicylic acid on human skin causes thinning of the corneal layer without any change in the thickness of the epidermis.[(8)] Asians represent a rather challenging group of patients because of the greater tendency to develop post- inflammatory hyperpigmentation as sequel of acne or any inflammation of the skin.[(9)]

Intense pulse light has been used for the treatment of facial acne. Light and laser- based treatment options have, in recent years, become established as an alternative to traditional topical and oral medications. Light and lasers appear to reduce inflammatory acne lesions by targeting some of the main pathophysiologic factors such as P.acne bacteria, sebaceous gland activity, and by reducing inflammation. Modifications of various parameters allow flexibility in treatment which include energy fluence, pulse duration and pulse delay.[(10)] IPL technology involves application of a non-coherent, non-laser broadband, filtered flash lamp source directed to the skin. Significant concomitant improvement in acne scarring provided by lasers is an advantage that no medical treatment provides. Many of the clinical studies have small numbers of enrolled patients, and are short in duration. Pertinent data supports that light devices can achieve control of acne flares when used as monotherapies or in combination with other modalities. Further clinical trials with better study design and more subjects are required to further

establish the role of various modalities of treatment in Asian acne patients.

Materials and Method

Twenty patients with grade 1- 4 facial acne were be included in the study. A clinical photograph and grading of acne using Michelson's acne severity index was done at the time of recruiting in the study. It is a prospective comparative study with convenient sampling method used. Informed written consent was taken from all the patients. Patients was not given any oral or topical anti- acne medication during the course of the study. Inclusion criteria →a. Clinically diagnosed case of facial acne vulgaris of grade 1-4 b. Age group included 15-35yrs exclusion criteria → a. Patient on anti-acne medications b. Patient with underlying systemic/ endocrine disorder c. Non consenting patient

In Michelsons acne severity index, number of comedones, papules, pustules, infiltrated and cystic lesions are counted. Severity index is 0.5 for comedones, 1 for papules, 2 for pustules, 3 for infiltrated lesions and 4 for cystic lesions. Multiplying each type of lesion with its severity index and adding score together give the final score.[10] Right side and left side of the face will be scored separately. One half of the face was subjected to monotherapy with IPL (Dermaindia; Chennai, Tamil Nadu). Test dose with IPL was done on the forearm and patient was started with 1 J less than the most tolerable dose. Fluence was increased by 1 J every session. 530 nm filter was used for the study. Other half of face was applied beta-hydroxy peel (30% salicylic acid%, zhora salic peel, lazhora medical cosmetics, Chennai). Before starting the peel, the face was thoroughly cleaned with alcohol and/ or acetone to remove oils from the skin. Two to three coats was applied to get a uniform peel. Peel was first applied to the medial cheeks, then laterally, followed by the perioral area, then chin, and lastly the forehead. Within 30 seconds to 1 minute of peeling, a white precipitate will be formed, as a result of crystallization of the salicylic acid. The patient experienced a stinging and burning sensation which increased over the next 2 minutes, reached a crescendo at 3 minutes and then rapidly decreased to baseline over the next minute. This is considered the end point of the peel.[11] Once the peel has had sufficient contact time, the face is rinsed thoroughly with tap water. A bland cleanser can be used to remove any residual salicylic acid precipitate.

Patient was administered beta- hydroxy acid peel on one half and intense pulse light on the other half of the face every 2 weeks for a total of six sessions. At the end of six sessions, acne severity index was calculated and digital photographs was taken for comparison with baseline data. Any side effects if noted was recorded.

Statistical analysis used: IBM SPSS Statistics software version 2015. Paired t-test was performed for statistical analysis.

Results

20 patients were enrolled in the study. Age group of the patients varied from 16-34years. Among 20 patients, 12 were females and 8 were males. Mean baseline score on the side of the face subjected to chemical peeling was 23.6. After 6 sessions of peeling, acne severity score reduced to 14.7. Mean baseline score on the side of the face subjected to intense pulse light was 24.8.Acne severity score reduced to 11.3 after 6 sessions. Intense pulse light treated side of the face showed better results than chemical peeling treated side. (Table 1: Acne severity score after every session of chemical peeling and intense pulse light treatment) Intense pulse light treated side showed 54.4% reduction in acne severity score whereas chemical peeling treated side showed 34.4% reduction. Paired t-test was performed for statistical analysis. Intense pulse light treated side showed statistically significant improvement. (SD- 3.743, t-value =4.632). Mean+SD for age groups (in years)of the patients enrolled→ 25+/- 4.67; mean + SD for baseline acne severity score index in chemical peeling treated side→ 23.6+/- 2.21; mean + SD for baseline acne severity score index in IPL treated side→ 24.8 +/- 2.12.

Fig. 1: Patient 1- Before & after IPL treatment

Fig. 2: Patient 2- Before & after treatment with IPL & chemical peeling

Fig. 3: Patient 3- Before & after treatment with chemical peeling

Fig. 4: Patient 4- Before & after treatment with IPL & chemical peeling

Three patients developed cutaneous side effects on chemical peeling treated side in the form of dryness in one, intense exfoliation in another & contact sensitization in the third patient. One patient developed prolonged erythema post-intense light treatment. Salicylic acid peel has better effect on post-acne hyperpigmentation compared to intense pulse light. (Table 2: Associations of various parameters with intense pulse light and chemical peeling treatment). p value= 0.000182, result is statistically significant at $p<0.05$.

Table 1: Acne severity score after every session of chemical peeling and intense pulse light treatment

Number of sessions	Mean acne severity score	
	Chemical peeling treated side	Intense pulse light treated side
Baseline	23.6	24.8
After 2nd session	20.9	20.5
After 4th session	18.1	16.2
After 6th session	14.7	11.3

Table 2: Associations of various parameters with intense pulse light and chemical peeling treatment

Parameter	Chemical peeling treated side	Intense pulse light treated side
Percentage of reduction of acne severity score after 6 sessions	37.7%	54.4%
Percentage of patients developing post acne hyperpigmentation after 6 sessions	25%	35%
Percentage of patients showing visible cutaneous side effects	15%	5%
Percentage of patients developing recurrence of acne within 3 months after treatment	5%	-

Discussion

Clinicians and patients often use chemical peels as an adjunct to medical therapy in acne because they produce complementary rapid therapeutic effects and improvements in skin appearance and textures.[12,13] Peels may allow topical acne agents to penetrate more efficiently into the skin and may improve post inflammatory hyperpigmentation.[14]

Salicylic acid has very good safety profile. It is low in cost, easy to apply and has the ability of self-neutralization.[3] The salicylic acid peel has an advantage over the alpha hydroxy acid peel in that the former does not need to be neutralized and the frost is visible once the peel is complete.[15] Salicylic acid peel is safer in individuals of darker ethnicity.[16] Another benefit of salicylic acid is its lightening effect on post inflammatory pigmentation due to acne.[17] Asian acne patients have clinical features distinct from that of Caucasians. One is the lesser incidence of nodulocystic acne.[3] Lee HS et al[5] treated thirty- five Korean patients of facial acne with 30% salicylic acid peels biweekly for 12 weeks. They observed that both inflammatory and non-inflammatory acne lesion counts were decreased in proportion to the duration of treatment and Dr. Cunliffe's acne grade was statistically significantly decreased after treatment. Kessler E et al[19] recruited twenty patients in split face, double blind, randomized, controlled study. An alpha- hydroxy acid (30% glycolic acid) was applied to one half of the face and a beta- hydroxy acid peel (30% salicylic acid) was applied contralaterally every two weeks for a total of six treatments. They observed that both chemical peels were significantly effective by the second treatment ($p<.05$) for mild to moderately severe facial acne vulgaris. Peeling with salicylic acid has been well documented in the literature, but certain adverse effects occur, which are usually mild and transient. Side effects of salicylic acid peeling are- a) prolonged erythema b) intense exfoliation c) crusting d) dryness e) pigmentary dyschromias f) systemic toxicity, salicylism g) hypoglycaemia h) contact sensitization. It has been postulated that light based therapies work to decrease Propionibacterium acne level and reduce pilosebaceous unit size and function.[20] Specifically, light is absorbed by porphyrins produced naturally within sebaceous follicles by P.acne.[21,22] Porphyrins absorb light wavelength between 400 and 700 nm. Light absorption leads to photo- excitation of porphyrins and subsequent release of singlet oxygen and reactive free radicals that exert bactericidal effects on P.acne.[23] Elman et al treated 19 patients with IPL and showed that 85% of the

individuals had a >50% improvement in their acne vulgaris lesions following twice weekly therapy for 4 weeks.[24] Dierickx et al reported clearance rates of 72% for non-inflammatory acne vulgaris lesions and 73 % for inflammatory acne vulgaris lesions with IPL.[25] Paithankar *et al* reported 50% reduction in inflammatory acne vulgaris with IPL.[25] M Kumaresan et all study, treated 10 patients & showed that the mean total score was 49.4 at baseline and showed 49.19% reduction after four sessions of IPL whereas in our study Mean baseline score on the side of the face subjected to intense pulse light was 24.8 and Acne severity score reduced to 11.3 after 6 sessions[26] in a study by Levesque et all, there was a statistically significant decrease of 48.5% from baseline to Day 98 in the mean number of non-inflammatory lesions for the sides treated with salicylic acid peels, whereas in our study acne severity score reduced to 14.7.[27] Conclusions on the efficacy of light based therapies are limited by the few number of studies comparing light based treatments with standard pharmaceutical treatments such as antibiotics and retinoids. This study will throw more knowledge on the efficacy of intense pulse light as monotherapy for treatment of acne when compare to other modalities like beta hydroxy acid peel. Salicylic acid peeling is low in cost, easy to apply & has the ability of self-neutralization. It is used as an adjuvant therapy. It's safer in darker ethnics & has a lightning effects on post inflammatory pigmentation due to acne vulgaris. Whereas IPL showed better results on inflammatory acne & shows less recurrences with minimal cutaneous visible side effects. Hence it can be used as a monotherapy in the treatment of acne. Therefore this study was conducted to compare the efficacy, safety & after effects of 2 modalities of treatment in acne.

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