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Efficacy of excimer light therapy for treatment of localized, progressive vitiligo

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ABSTRACT

Introduction: Vitiligo is an acquired, circumscribed, depigmented macules due to loss of functional melanocytes. Excimer light cause immunosuppression as well as stimulation of follicular melanocytes. **Materials and methods:** After taking consent, the dose of the therapy was arbitrarily started at 100 mj/cm^2, given twice a week, with incremental dose of 100 j/cm^2 every sitting. If erythema (or blister, if any) persists for more than 2 days, the dose was skipped until erythema (or blister) subsided. Then, the previous safe dose was continued. A total of 16 sittings was given. Photographs were taken pretreatment, after 2 months and after 4 months and were assessed by two independent doctors who were not involved in the study. **Results:** Among 25 patients, 16 patients (64%) achieved good results and 3 patients (12%) achieved excellent result. **Conclusion:** Excimer light therapy is a good option for treatment of localized vitiligo. However, those lesions on the lips and acral areas responded very poorly.

Key words: Vitiligo; Excimer light therapy; Keratinocytes; Melanocytes

INTRODUCTION

Vitiligo is an acquired, circumscribed, depigmented macules due to loss of functional melanocytes [1]. It has a great psychosocial impact on the patients. The exact etiopathogenesis is unclear. It seems to be multifactorial, i.e., genetic, endogenous and exogenous factors [1-3]. There are two types of vitiligo, viz. Absolute which has no DOPA – positive melanocytes and Relative type which has decreased DOPA-positive melanocytes. Keratinocyte-derived cytokines like decreased stem cell factor (SCF), TNF-alpha and IL-1 may play role in the pathogenesis [3-10]. There are few hypothesis regarding pathogenesis. Autoimmune hypothesis in which complement fixing antibodies against melanocytes are pathogensic. Neurogenic hypothesis states that a compounds released from the peripheral nerve ending have toxic effects on melanogenesis. The Self-destructive theory suggests that melanocytes are destroyed themselves due to defect in natural defence mechanism that removes toxic materials. Vitiligo may be localised, which may be focal or unilateral/segmental: Generalized, like vitiligo vulgaris, acrofacial vitiligo or mixed or Univarsalis where complete/almost complete depigmentation. Excimer light emits UV light of 308 nm wavelength, causing immunosuppression by T cell apoptosis. The apoptosis mechanism may be caused by the damage of the epidermal and dermal cells which are susceptible to UV light exposure. It causes DNA damage and formation of pyrimidine dimer. In addition to T cell apoptosis, it also triggers changes in cytokine production, local immunosuppression, stimulation of melanocyte-stimulating hormone (MSH), increases migration, proliferation of melanocytes and melanogenesis. The current therapies include Corticosteroids, Calcineurin inhibitors, UV Therapies and surgical procedures like mm grafting. UV Light stimulates activation and migration of melanocytes which are lying dormant in the hair follicles [1-14].

MATERIALS AND METHODS

The aim of the study is to know the efficacy of excimer light therapy foot treatment of vitiligo. The study was done at RNT Medical College, Udaipur, Rajasthan. Ethical clearance and informed consent were taken prior

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to the study. Patients having localized patches, who had not taken any treatment within 8 weeks, were included in the study. Widespread lesions, patients taking any treatment within 8 weeks, pregnant and lactating and patients having history of photosensitivity were excluded from the study. Only emollient was allowed to apply in the treated areas during the study. The dose of the therapy was arbitrarily started at 100 mj/cm^2, given twice a week, with incremental dose of 100 j/cm^2 every sitting. If erythema (or blister, if any) persists for more than 2 days, the dose was skipped until erythema (or blister) subsided. Then, the previous safe dose was continued. A total of 16 sittings was given. Photographs were taken pretreatment, after 2months and after 4 months, and were assessed by two independent doctors who were not involved in the study. Less than 50% improvement after treatment was considered as failure to treatment, 50-75% as good response, and >75% as excellent response.

RESULTS

A total of 25 cases enrolled in the study, aged between 12 – 40 years. 15 patients were female and 10 patients were male (Table 1). The photos showing the progress of treatment were made for each patient (Figs 1 – 3); a control site showing on the Figures 4 and 5.

Table 1: A total data of all patients

Sl.no	Age	Sex	Duration of the disease	Site/ sites	Improvement after treatment
1	18	F	1 year	Feet	60%
2	21	F	6 months	Hands	40%
3	23	F	8 months	Arms	80%
4	21	F	2 years	Forearms	70%
5	34	F	10 months	Cheeks	60%
6	30	F	3 years	Back	80%
7	40	F	4 years	Back	60%
8	25	F	2 years	Feet	80%
9	34	F	2 years	Arms	60%
10	32	F	4 years	Neck	60%
11	20	F	6 months	Back	60%
12	19	M	4 months	Neck	70%
13	12	M	3 months	Feet	60%
14	15	M	11 months	Forearms	70%
15	24	M	12 months	Arms	60%
16	27	M	2 years	Face	60%
17	31	M	2 years	Lips	<10%
18	33	M	5 years	Fingers	<20%
19	23	M	3 years	Lips	<10%
20	21	M	2 months	Fingers	<20%
21	26	F	1 year	Forearms	30%
22	25	F	4 months	Arms	55%
23	29	F	2 months	Leg	60%
24	22	F	6 months	Leg	60%
25	23	M	8 months	Leg	55%
<50% improvement					6
50-75% improvement					16
>75% improvement					3

Figure 1: Before treatment

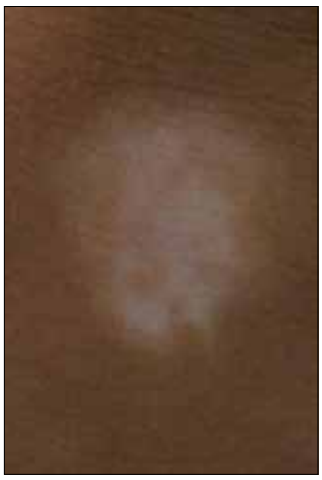

Figure 2: After 1 months of starting therapy

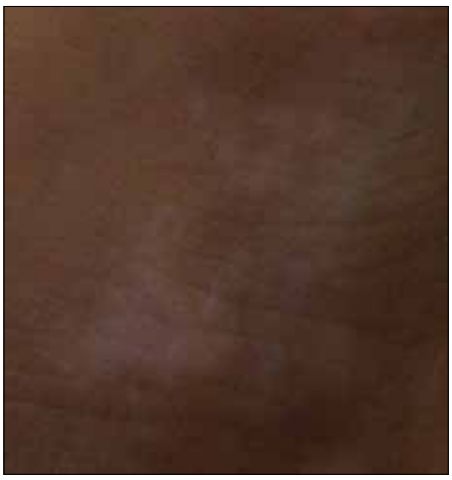

Figure 3: After 2 months of treatment

Figure 4: Control site (before treatment)

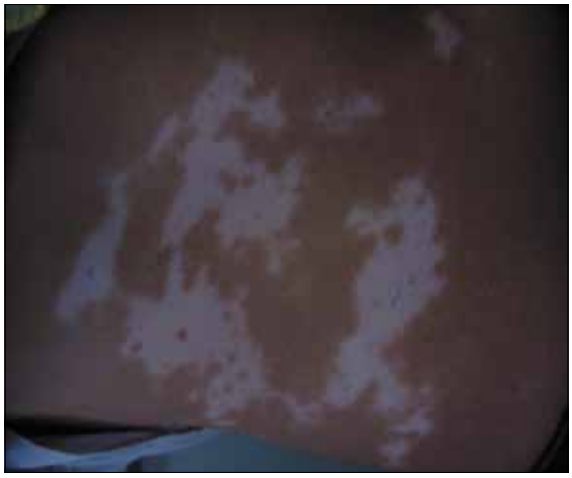

Figure 5: Control site after 2 months

DISCUSSION

An excimer laser (sometimes more correctly called an exciplex laser) is a form of ultraviolet laser. The wavelength of an excimer laser depends on the molecules used and is usually in the ultraviolet spectrum at wavelengths [3-9]. The depth of penetration depends upon wavelength of laser and tissue type. It does not cause thermal destruction on interaction with human tissue, a photochemical mechanism is responsible for decomposition and for explosion of the organic material, termed ablative photodecomposition. Excimer lasers and light are pulsed wave lasers, they deliver a high energy in a short time, thus rapidly breaking chemical bonds. The pulse width of these lasers is so short that the temperature of surrounding material does not change but remains intact [6-13]. It can be delivered through a fiber optic cable which makes it possible to selectively target different lesions on the body surface. The use of a monochromatic wavelength of 308 nm gives photobiological effects superior to those provided by NB-UVB. The main targets for UV-B is DNA contained in epidermal cells (keratinocytes, melanocytes) and to a lesser extent, in dermal cells (fibroblasts). Inflammatory reactions could also be involved [3-15].

According to Al-Otaibi SR, et al (2009), Thirty-four patients (14 males and 20 females) with localized treated using a 308-nm excimer laser twice weekly for 13 weeks with a dose started with 50 to 100 mJ/cm2 (according to site) and increased by 50 mJ/cm2 in every session until erythema appeared for 25 sessions, or until 100% repigmentation, whichever was achieved first showed. Lesions on the face responded better than elsewhere on the body. The least responsive areas were the hands and feet. The average number of treatment sessions prior to repigmentation was 11. Untreated control patches remained unchanged. In higher skin phototypes the response was more favorable. There was no significant correlation between the age of the patients and their response to treatment [16].

Study conducted by Wang HW, et al (2009) on 170 patients with stable vitiligo by using the 308 nm excimer laser showed that rates of "remarkably improved" and "cured" were 67.97% and 32.03% in faces, 54.55% and 27.27% in necks, 63.26% and 26.53% in trunks, 38.84% and 15.70% in limbs, and 0 and 0 in hands and feet. The areas of faces had a better response than those of necks, trunks, or limbs ($P < 0.01$) and the areas of trunks or limbs had better response than that of hands and feet ($P < 0.01$) [17].

Another study by Xiu-Ying Zhang, et al (2010) [18] on thirty-six patients with 44 vitiligo patches were treated using a 308 nm excimer laser, which was performed twice a week, for a total of 30 treatments showed after 30 treatments, 27/44 patches (61.4%) achieved more than 75% repigmentation, 4/44 lesions (9.1%) showed 51–75% repigmentation, 10/44 (22.7%) showed 26–50% repigmentation and 3/44 (6.8%) showed 1–25% repigmentation [18].

In our study, almost all patients developed repigmentation, but only 16 patients (64%) achieved good results and only 3 patients (12%) achieved excellent result. Those lesions on the lips and acral areas responded very poorly as expected from most of the literature. Repigmentation was started in the 2nd month in most of the patients. The difference in response in the different groups like age, sex and durations were not statistically significant as the p value was >0.005 for

both parameters. It was usually given for stable, localized vitiligo. But in our study, it was given for localized, progressive vitiliginous patches too where it not only stopped the progression of the lesion, it also helped in repigmentation. Regarding the safety, except transient erythema which was lasted for 3-4 days, no other serious side effect was encountered during the study period. There was no single patient who developed recurrence during the 6 months follow up period.

CONCLUSION

Excimer light therapy is an efficacious and safe option for treating localized vitiligo. It not only helped in repigmentation, it also stopped progression of the localized disease.

CONSENT

Ethical Requirements for Studies Involving live human subjects or animal: accepted by author. The examination of the patient was conducted according to the Declaration of Helsinki principles. Written informed consent was obtained from the patient for publication of this article.

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