

# Efficacy of 308 nm Excimer laser in the treatment of vitiligo: A Retrospective study

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## Abstract

**Background** Vitiligo is a chronic, polygenic dyschromia that presents with multiple depigmented macules & patches. Widespread prejudices, ignorance, taboos, lack of scientific appraisal and confusion of vitiligo with leprosy all makes it an immense psychological stress.

**Objectives** To determine the efficacy of 308 nm excimer laser in vitiligo.

**Materials and Methods** Record based retrospective study of 40 patients with localized vitiligo who were treated with 308nm excimer laser were included. Twice weekly 308nm excimer laser (Eximal elite, GSD<sup>®</sup>) was given to 40 patients with 120 vitiligo lesions till complete resolution or till maximum 30 sessions whichever occurred earlier. Initial doses used were of 200-250mJ/cm<sup>2</sup> with increments of 50mJ/cm<sup>2</sup> every session. Repigmentation was monitored by serial photographs and graded as excellent ( $\geq 75\%$  repigmentation), good (50–74% repigmentation) and poor (<50% repigmentation) at the end of study period. The extent of repigmentation achieved was correlated with site of the lesion.

**Results** A total of 40 patients each with 1-5 vitiligo lesions between age group of 6-69 years were included. Females outnumbered males in the ratio of 1.5:1. Majority of the patients belonged to <15 years age group. Seven patients had segmental vitiligo while 33 were diagnosed as non segmental vitiligo. The most common site affected was lower limbs followed by trunk. Out of 120 lesions treated, 32 lesions (26.6%) showed excellent response. Among rest of 88 lesions, 39 lesions (32.5%) failed to show satisfactory response to treatment while 40.8% showed good response. Lesions on trunk responded best to treatment followed by lower limb. Eighteen (45%) patients aged less than 18 years showed excellent to good response.

**Conclusion** 308nm excimer laser is as promising therapy in treatment of localized vitiligo especially in children with rapid onset of repigmentation as early as 3 sessions of treatment.

**Limitations** The study is limited by its retrospective nature and small sample size.

## Key words

308nm excimer laser, vitiligo, treatment.

## Introduction

Vitiligo is an acquired disorder characterized by circumscribed depigmented macules & patches

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that result from a progressive loss of functional melanocytes.<sup>1</sup> It affects about 1% of the world population. The disease causes tremendous psychological trauma, especially in people with coloured skin.<sup>2,3</sup> Treatment of vitiligo aims at controlling the progress of the disease and achieving repigmentation in lesions that have already developed. Among the treatment options

available, targeted phototherapy ranks the most effective, especially in patients with localized vitiligo.<sup>4</sup>

Targeted phototherapy (also known as concentrated phototherapy, microphototherapy and focused phototherapy) is the term used when the phototherapeutic device specifically "targets" the lesional skin through special delivery mechanisms while the rest of the skin remains unexposed. It can be achieved by different sources: Excimer laser (308nm), excimer light (intense pulse light systems) & non laser ultraviolet light sources. Targeted phototherapy is usually administered twice or thrice a week on non-consecutive days. The dose is gradually increased every session until a faint erythema is observed or when the patient develops perifollicular pigmentation. It targets specifically the lesional skin, leaving the normal area untreated, thus minimizing the side effects of conventional NB-UVB phototherapy.<sup>5-7</sup>

Excimer laser is emerging as an effective treatment modality in vitiligo and few studies are done in Indian context. Hence this study is undertaken to assess the efficacy and safety of 308nm excimer laser in treatment of vitiligo.

## **Materials and Methods**

A retrospective study was conducted after obtaining ethical clearance from institutional ethical committee at tertiary care hospital at Mandya. The records of vitiligo patients treated with 308nm excimer laser during January 2017 and June 2018 were reviewed. A total of 40 patients with stable vitiligo involving less than 5% body surface area (BSA) were included. "Stable vitiligo" was defined as patient with no new lesions, no progression of existing lesions & absence of koebner phenomenon during the past 1 year.

Demographic details of the patients like age, sex, Fitzpatrick skin type, duration of the diseases, Site of the lesions were recorded. Patients were classified into segmental vitiligo and non segmental vitiligo depending on the type of vitiligo as per the Vitiligo Global Issues Consensus Conference classification.<sup>8</sup>

Patients with vitiligo involving more than 10% of BSA, those with mucosal vitiligo, those with acral vitiligo, photosensitive disorders, those on immunosuppressant or immunomodulators, those on topical therapy, children < 5 years, pregnant and nursing mothers were excluded from the study.

The patients were treated twice weekly with 308nm excimer laser (Eximal elite, GSD®). It emits ultraviolet B light of wavelength 308nm. The beam of ultraviolet light was adjusted to the shape of treatment area with the help of filters of different shapes. During the treatment session, both treating doctor and the patient wore protective eyewear.

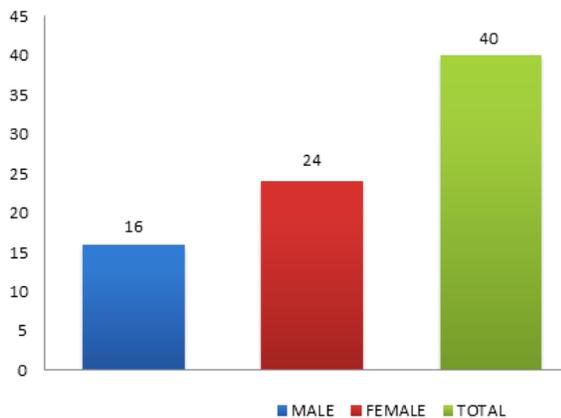
Majority of the patients were of Fitzpatrick's skin type IV and above, Initial doses used were 200-250 mJ/ cm<sup>2</sup> with increments of 20% every session until a faint erythema was obtained. The same dose was then continued until the patient showed mild erythema or perifollicular (**Figure 1**) / marginal pigmentation (**Figure 2**). If patient developed painful erythema or blistering, treatment was skipped for a week and then resumed with 20% reduction from the previous dose. No topical or oral therapy were allowed during the study period and patients were followed up weekly for evidence of pigmentation by serial photographs. Treatment was continued till complete resolution or till maximum 30 sessions whichever occurred earlier. Patients who did not show any evidence



**Figure 1** Vitiligo lesion showing marginal repigmentation



**Figure 2** Perifollicular repigmentation in a vitiligo patch



**Figure 3** Distribution of patients according to sex

of pigmentation even after 12 sessions were considered for alternate treatment options.

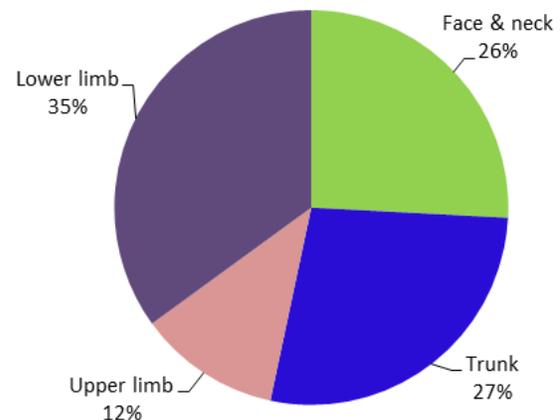
Repigmentation achieved was graded as Excellent ( $\geq 75\%$  repigmentation), Good (50–74% repigmentation) and Poor ( $< 50\%$  repigmentation). The extent of repigmentation achieved was correlated with site of the lesion and number of treatment sessions.

## Results

Out of the 40 patients included, 16 (40%) were male and 24 (60%) were female with M:F of 1:1.5 (**Figure 3**). The age of the patients ranged from 6-69 years with a mean of 27.3 years (**Table 1**). Seven (17.5%) patients were found to have segmental vitiligo whereas the remaining 33 (82.5%) non segmental vitiligo.

Overall, a total of 120 lesions were treated and the most common site affected was lower limbs (35%) followed by trunk (27.5%), face & neck (25.8%) and upper limb (11.6%) (**Figure 4**). No acral lesions were treated or included in the study results.

Excellent response ( $\geq 75\%$  repigmentation) was achieved in 26.6% (32/120) lesions (**Figure 5**) whereas 40.8% (49/120) lesions showed a good response (50–74% repigmentation) (**Figure 6**).



**Figure 4** Distribution of lesions based on site



**Figure 5(a)** Before treatment **(b)** Excellent response after 22 sessions of treatment



**Figure 6(a)** Before treatment **(b)** Good response achieved after 30<sup>th</sup> sessions



**Figure 7(a)** Before treatment **(b)** Poor response achieved after 30<sup>th</sup> session of treatment

The rest of the 32.5% (39/120) lesions failed to show satisfactory response to treatment and were graded as poor response at the end of 30 sessions (**Figure 7 & Table 2**). The repigmentation achieved was correlated with the site treated and it was noted that the lesions over the trunk showed best response to treatment followed by lower limbs. Out of the 33 lesions treated over the trunk, 29 (87.8%) showed excellent to good response and only 4 (12.1%) failed to show a significant response (**Table 3**).

Patients were compliant to the treatment and no patients dropped out of the study. The first evidence of pigmentation was observed as early as 3<sup>rd</sup> session in 6 patients. However, the mean number of doses taken for the repigmentation to start was 7.9 i.e. 4 weeks.

Side effects to the treatment regimen were not common and the only adverse reaction observed was painful erythema that was seen in 2 patients. None of the patients developed blistering reaction or any other side effects.

**Table 1** Age wise distribution of patients

Age in years	No. of patients
5-15	15
16-25	7
26-35	04
36-45	07
46-55	04
>55	03
Total	40

**Table 2** Response achieved

Response	No. of lesions
Excellent response	32 (26.6%)
Good response	49 (40.8%)
Poor response	39 (32.5%)
Total	120

**Table 3** Site of lesions treated and response achieved

Site of lesions	No. of lesions	Response		
		Excellent	Good	Poor
Face and neck	31	5	13	13
Trunk	33	11	18	4
Upper limbs	14	3	4	7
Lower limbs	42	13	14	15
Total	120	32	49	39

## **Discussion**

Vitiligo is a chronic, benign disorder of pigmentation with an incidence of 0.3-2.5% in India.<sup>9</sup> Though various treatment options are available, results are often unsatisfactory. Phototherapy has revolutionized the medical management of vitiligo and at present, NB-UVB phototherapy is considered the treatment of choice in patients with generalized vitiligo.<sup>10-12</sup> Targeted phototherapy has an edge over whole body NB-UVB, especially for localized vitiligo. Among targeted phototherapy devices currently available, excimer laser has been shown to induce the most rapid onset of repigmentation in vitiligo.<sup>13</sup>

A variety of theories exist to account for the efficacy of light therapy in the treatment of vitiligo. It is hypothesized that inactive melanocytes present in the outer root sheaths of hair follicle are spared in vitiligo. Phototherapy induces the maturation of these latent melanocytes followed by upward migration along the hair follicle with ultimate dissemination in the epidermis.<sup>14</sup> Perifollicular repigmentation in treated lesion of vitiligo and the paucifollicular areas like the fingers and genitalia, showing poor repigmentation supports this theory. Acral areas are most refractory to therapy owing to the fact that they have decreased hair bearing potential.<sup>15</sup>

In a study on targeted phototherapy in vitiligo by Majid & Imran, 40 patients were treated twice weekly with targeted narrowband ultraviolet B therapy.<sup>6</sup> A total of 77.5% patients achieved repigmentation ranging from 50-100%. Repigmentation appeared as early as 2<sup>nd</sup> week of treatment. The site to show best response was face and neck. The only adverse effect noted was intense erythema and burning sensation that was observed in 4 patients.

Asawanonda et al. reported good response in 29 vitiligo lesions treated with targeted broadband UVB phototherapy in 6 patients with localized vitiligo.<sup>16</sup> Treatment was given twice weekly for 12 weeks. Onset of pigmentation was seen as early as 3 weeks and the response depended on the site of the lesions.

In a retrospective study by Raghuwanshi et al. out of 134 patients treated with once weekly targeted phototherapy, response was mild in 58.2% patients where as 37.3% showed moderate response and 4.5% had an excellent response.<sup>7</sup> Response was found to be directly proportional to the number of sittings. The lesions over the trunk showed an excellent response followed by lower limbs. Erythema was the most common side effect noted.

Menchini et al. conducted a study on 734 vitiligo patients who were treated with narrowband UVB microphototherapy for 12 months.<sup>17</sup> He reported that 69.48% patients achieved >75% repigmentation, of which 15.25% showed complete repigmentation and 21.12% achieved 50-75% pigmentation. Less than 50% pigmentation was noted in 9.40% patients.

In the present study, out of the 120 lesions treated 67.5% achieved good to excellent response where as poor response was achieved in 32.5% of lesions. The first evidence of pigmentation was observed as early as 3<sup>rd</sup> session in 6 patients. However, the mean number of doses taken for the repigmentation to start was 7.9 i.e. 4 weeks. The most common site to show best response was trunk followed by lower limbs whereas in the study by Majid & Imran, face and neck showed excellent response. 18 children (<18 years) were included in the study and it was observed that all of them achieved good to excellent response. The only side effect observed was painful erythema seen in 2 patients.<sup>6</sup>

The promising results obtained from 308nm excimer laser in treatment of localized vitiligo makes it have an extra edge over the conventional NB-UVB phototherapy, especially in children as it is observed in this study that 100% of the children achieved good to excellent repigmentation. Also because of easy administration in children as delivery is hand held. The retrospective nature of the study and the small sample size are the limitations of this study. To validate our results a prospective study with large sample size may be required.

### Conclusion

Vitiligo is a common pigmentary disorder with tremendous psychological trauma due to the widespread myths and prejudices attached to it. Despite various treatment options available, none have proved to be highly efficacious. 308nm excimer laser is a promising therapy in treatment of localized vitiligo especially in children with rapid onset of repigmentation as early as 3 sessions of treatment.

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