

# Dermoscopic evaluation of efficacy of 308 nm Excimer Laser in treatment of idiopathic guttate hypomelanosis - A descriptive longitudinal study

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**Abstract** *Objective* The objective of this study is to dermoscopically evaluate the effectiveness of 308 nm Excimer laser in the repigmentation of IGH macules.

*Methods* A total of 44 patients were recruited for the study. In each patient five IGH macules were treated with 308 nm Excimer laser twice weekly for 3 months. The degree of pigmentation improvement was assessed as follows:  $\leq 25\%$  - minimal response, 26%–50% - moderate response, 51%–75% - good response, and  $>75\%$  - excellent response.

*Results* 40 patients successfully completed the study in total. 200 IGH macules were treated with the Excimer laser, of which 41.5% macules showed excellent improvement, 31% macules showed a good response, 21% macules showed moderate response and 6.5% macules showed minimal response. In 9% of IGH macules, side effect like post-inflammatory hyperpigmentation was noticed.

*Conclusion* 308nm excimer laser is a simple, safe, outpatient procedure for effective induction of pigmentation in IGH macules with minimum adverse effects and good patient satisfaction score.

**Key words**

Dermoscopy; Excimer Laser; Idiopathic guttate hypomelanosis.

## Introduction

Idiopathic guttate hypomelanosis (IGH) is a leukodermic dermatosis that mostly affects the elderly.<sup>1</sup> The primary pathomechanism is thought to be melanopenic hypomelanosis. The clinical presentation of this condition is characterized by multiple, discrete, well-defined, round to oval, hypopigmented to depigmented porcelain-white macules, typically measuring

between 0.2 and 2 cm in diameter.<sup>2,3</sup> The most commonly affected areas are those that are exposed to the sun, particularly the extensor aspect of forearms and the pretibial regions, with relative sparing of the trunk and face.<sup>3,4</sup>

In 1951, Costa originally referred to this condition as "symmetric progressive leukopathy of the extremities".<sup>4</sup> Cummings and Cottel then coined the current nomenclature after describing the syndrome in more individuals.<sup>5</sup> This condition typically affects older people, and as people get older, it seems to occur more frequently. Age affects the likelihood of developing IGH, which ranges from 47% (31–40 years) to 97% (81–90 years).<sup>6</sup>

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In the literature, there is still debate concerning IGH's pathophysiology. It has been proposed that IGH might not be idiopathic, but rather UV-induced. Trauma as well as senile degeneration have also been considered as etiological factors.<sup>6</sup> On histopathological analysis, flattened rete ridges, epidermal atrophy, and hyperkeratosis are all discernible in comparison to normal skin.<sup>7</sup>

Treatment of IGH is challenging, however, few studies have shown that therapies such as topical calcineurin inhibitors like tacrolimus 0.1%, pimecrolimus 1%, topical retinoids like tretinoin, topical application of 88% phenol, superficial dermabrasion, cryotherapy, fractional carbon dioxide laser, nonablative fractional photothermolysis, and excimer laser can be effective.<sup>8-11</sup>

This study's objective was to dermoscopically assess the 308 nm Excimer laser's efficacy in repigmenting idiopathic guttate hypomelanosis.

## **Methods**

The present clinical study was a descriptive longitudinal study conducted after obtaining institutional ethical committee clearance, in the department of Dermatology, Mandya Institute of Medical Sciences during the period from August 2022 to January 2023. The study subjects were chosen as per the inclusion and exclusion criteria. Inclusion criteria were patients with at least 5 IGH lesions, patients above 18 years of age and consent of patients to participate in the study. Exclusion criteria were pregnant and lactating women, patients with pre-existing dermatological condition which gets aggravated on exposure to ultraviolet radiation, patients taking medications with potential phototoxic side effect, any previous laser treatment, cryotherapy or phototherapy, patients with history of keloids or hypertrophic scars, patients

with history of vitiligo, patients with active infection, bleeding disorders and atrophic lesions.

Forty four Patients with Idiopathic guttate hypomelanosis (IGH) were recruited for the study after explaining the procedure in detail and after obtaining informed written consent. Patient's demographic data and relevant history was taken at baseline. Five IGH macules were treated with 308 nm Excimer laser (Excimal Elite) using the standard vitiligo protocol which comprised of twice weekly treatments for 12 weeks. Initially all patients were started at dose of 250 mJ/cm<sup>2</sup> with increments of 50 mJ/ cm<sup>2</sup> every week until the patient showed perifollicular or marginal pigmentation. No topical or oral therapy were prescribed during the study period. Treatment was continued till complete resolution of IGH macules or till maximum 24 sessions whichever occurred earlier. Photographs were taken at baseline, week 4, week 8 and week 12. Patients were further followed up for a duration of 1 month to look for any recurrence. Apart from serial photographic evaluation, patients were also assessed using a dermlite DL3N dermoscope before the start of treatment and at week 4, week 8 and week 12. Both physicians' and patients' clinical assessments was performed.

Physicians' clinical assessments was done using a quartile grading scale

Grade 0, no improvement at all;

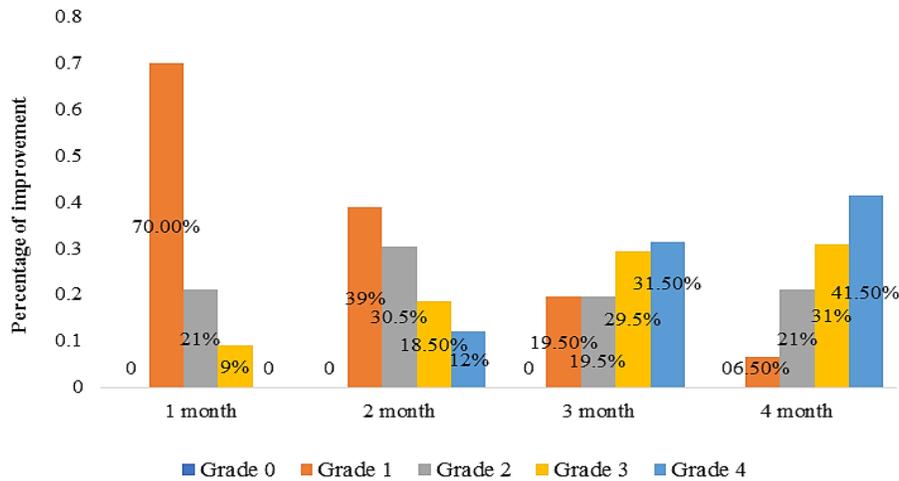
Grade 1, 1–25% = Minimal improvement;

Grade 2, 26–50% = Moderate improvement;

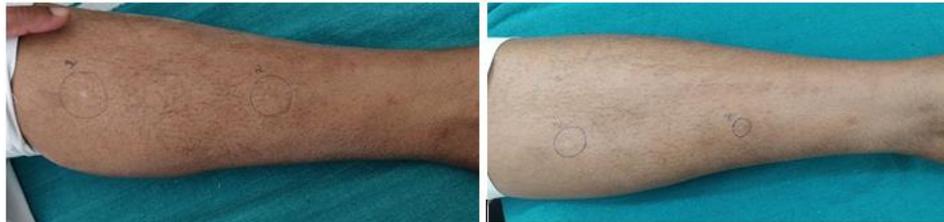
Grade 3, 51–75% = Good improvement;

Grade 4, >75% = Excellent improvement.

Patient satisfaction is measured using the following scale:



**Figure 1** Therapeutic response of IGH lesions from baseline till 12 week follow-up.



**Figure 2** Excellent response (>75%) with excimer laser (a) before and (b) after 16 week follow-up.

0 = Not satisfied; 1 = Satisfied; 2 = Extremely satisfied.

Patients were also observed for side effects of laser like erythema, burning sensation, post inflammatory hyperpigmentation.

The collected data was entered in excel spreadsheet and was analyzed with SPSS software version 17. Descriptive analysis such as mean, percentage, proportion, standard deviation, etc. were utilized. Tests for determining statistically significant differences or associations, such as the Wilcoxon Signed Ranks Test and the T test, were utilized.

## Results

A total of 44 patients were recruited for the study, out of which 4 were male and 40 were female (M:F = 1:10), with ages ranging from 32 to 66 years with a mean age of 52.37 and a SD of 7.83 years. The duration of IGH ranged from 1 to >10 years in our study with mean duration

of 6.7 years. The majority of our patients (95%) had an insidious onset with no associated itching.

In our study we found that IGH macules were most commonly distributed over lower limbs (72.7%), followed by the upper limbs (18.2%) and trunk (9.1%).

A total of 44 patients were recruited out of which 40 patients completed the treatment and 4 patients were lost to follow up.

Among the 200 macules that received 308 nm excimer laser treatment, 83 (41.5%) macules showed excellent improvement- >75%, 62 (31%) macules showed a good response - 51%–75%, moderate response - 26%–50% was shown by 42 (21%) macules, and 13 (6.5%) macules showed minimal response - ≤25% (**Figure 1,2**).

The summary of treatment response at each follow-up visit is depicted in **Table 1**.

**Table 1** Summary of therapeutic response in treatment group at each visit.

Number of visits	Improvement grade	Number of macules (%)
First follow-up visit (4 weeks)	Excellent	0 (0%)
	Good	18 (9%)
	Moderate	42 (21%)
	Minimal	140 (70%)
Second follow-up visit (8 weeks)	Excellent	24 (12%)
	Good	37 (18.5)
	Moderate	61 (30.5%)
	Minimal	78 (39%)
Third follow-up visit (12 weeks)	Excellent	63 (31.5%)
	Good	59 (29.5%)
	Moderate	39 (19.5%)
	Minimal	39 (19.5%)
Fourth follow-up visit (16 weeks)	Excellent	83 (41.5%)
	Good	62 (31%)
	Moderate	42 (21%)
	Minimal	13 (6.5%)



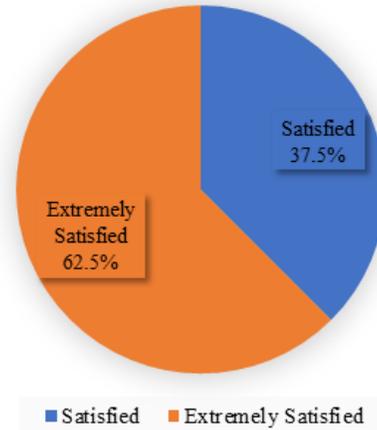
**Figure 3** Dermoscopic image showing excellent response (>75%) (a) before (b) at 16 week follow-up.

There was individual variation in the degree of pigmentation in each macule.

Repigmentation was assessed using a dermlite DL3N dermoscope before starting treatment and at week 4, week 8, week 12 and week 16. Marginal type of repigmentation was noted (**Figure 3**).

Repigmentation was noted by around 4–8 weeks. None of the repigmented macules showed reappearance of depigmentation at the end of the 4-month follow-up period.

Patient satisfaction was measured at the fourth follow up visit. 15 (37.5%) patients were satisfied and 25 (62.5%) patients were extremely satisfied with the improvement (**Figure 4**).



**Figure 4** Pie chart showing Patient satisfaction score

Side effect like post inflammatory hyperpigmentation was noted in 18 (9%) macules which persisted at 4<sup>th</sup> month of follow up.

The data was analyzed using Wilcoxon Signed Ranks Test with Z value being -5.356<sup>b</sup>, and P value of 0.0001.

### Discussion

IGH is a relatively common acquired hypomelanotic disorder that is related to ageing.<sup>1,2</sup> It can affect young individuals in their 20s and 30s as well as about 87% of those over the age of 40. Various studies have shown that IGH is more commonly seen in females which might be due to the higher aesthetic concern in females. IGH is present in all skin types, however it is more apparent in people with dark skin.<sup>2,4</sup>

IGH's precise etiopathogenesis is not completely known. Its pathophysiology may be influenced by genetics, as shown by a favorable family history, and factors related to the environment. In renal transplant patients, HLA-DQ3 was favorably correlated with the development of IGH, but HLA-DR8 was negatively correlated with the development of IGH. Other proposed theories include age related degeneration of

melanocytes, trauma, repeated exposure to UV rays, autoimmunity and local suppression of melanogenesis.<sup>2,4</sup>

Basket weave hyperkeratosis and a reduction in melanocytes are histopathological findings of IGH lesions. These melanocytes may have few melanosomes, decreased number of dendrites, dilated endoplasmic reticulum, swollen mitochondria. Fibroblasts, elastic and collagen fibers in dermis seem to have a normal configuration. 85% of facial IGH lesions have shown mild perivascular mononuclear inflammatory infiltrate in upper dermis.<sup>2,7</sup>

Dermoscopy of IGH lesions reveals perimetric pigmentary extensions with pigmented specks dispersed inside the macules. The four dermoscopic patterns of IGH are nebuloid, petaloid, amoeboid and feathery. Among these nebuloid pattern is found in newly formed IGH macules while the other three patterns are seen in long standing cases.<sup>13</sup>

Vitiligo, pityriasis alba, tinea versicolor, tuberous sclerosis, guttate morphea, lichen sclerosis et atrophicus, and post-inflammatory hypopigmentation comprise the differential diagnoses of IGH. IGH is frequently mistaken for vitiligo and the differentiation of the two is important as the latter is progressive in nature and is associated with social stigma.<sup>2</sup>

IGH being an asymptomatic benign condition can be left untreated. However in cosmetically concerned patients different treatment modalities have been tried which includes topical calcineurin inhibitors such as 0.1% tacrolimus cream and 1% pimecrolimus cream, topical retinoids like 0.025% tretinoin, topical 88% phenol, intralesional corticosteroids, cryotherapy, superficial dermabrasion, lasers like excimer laser, fractional CO<sub>2</sub> laser.<sup>4, 14,15</sup>

Phototherapy in the form of UVA and UVB has been used to treat many skin conditions. Recent innovations like the monochromic excimer laser combine and breakdown noble gas and halogen gas to generate UVB at a wavelength of 308 nm. Excimer is hypothesized to stimulate repigmentation through immunosuppression and immunomodulation. It has been proposed that excimer increases the production of endothelin-1 by keratinocytes, which in turn drives melanocytes to produce melanin.<sup>10,12,16</sup>

In a study conducted by Gordon JR 6 patients with IGH were irradiated with 308nm excimer laser for a period of 12 weeks. At the completion of the study 50% of the patients achieved full repigmentation and all 6 patients reported improvement over the span of treatment with no adverse effects noted during the course of the study.<sup>10</sup>

In a case report by Kreeshan F, Madan V a 48 yrs. old female with 8years history of IGH who failed to respond to topical medications was treated with excimer laser, furthermore once daily application of topical bimatoprost was done to a small patch. She underwent further six sessions of combination treatments after the combination treatment patch showed signs of improvement after five sessions. Small macules had considerable repigmentation, while larger macules continued to improve.<sup>17</sup>

The limitations of this study were the limited sample size and short follow-up period, which calls for additional research to verify our findings. To the best of our knowledge, this is the first study to dermoscopically evaluate the effect of 308nm excimer laser in the treatment of IGH.

## **Conclusion**

IGH is a frequent acquired leukoderma that

affects a significant section of the population and can be unsightly for individuals. In our study 308nm excimer laser was found to be effective in inducing pigmentation in IGH macules and it was confirmed by dermoscopy. Excimer laser appears to be a reliable and safe treatment modality for IGH. However additional large-scale studies comparing excimer laser with other treatment modalities, with a longer follow-up period is recommended.

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