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Original Article

Efficacy of 1,064 nm Q-Switched Nd:YAG Laser treatment for the Nevus of Ota

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Abstract

Objective To evaluate the efficacy of 1064nm Q-switched Nd:YAG laser in the treatment of Nevus of Ota.

Methods This study was conducted in Department of Dermatology, Unit-II, KEMU/Mayo Hospital, Lahore. A total of 100 patients of nevus of Ota (both unilateral and bilateral) with Fitzpatrick skin type III to V were included in this study. Baseline photographs and Pigment area and Severity Index (PSI) score was recorded. All patients were treated with 1064nm Q-switched Nd:YAG laser at fluence of 500-600 V and frequency of 5Hz. A total of 10 sessions at 2 weeks interval were given. Final assessment was done at 4 weeks after last session. Improvement was measured in terms of percentage reduction in baseline PSI score.

Results Mean age of the patients was 24.35±5.70 years. There were 15.0% males and 85.0% females. Majority of the patients had duration of lesion > 15 years. Most of the patients presented with skin type IV. 52.0% patients showed more than 50% clinical improvement. Improvement was higher in females (56%) and in patients with skin type III (50%) and IV (60%). Stratification with regards to age and duration of lesion showed no statistically significant difference.

Conclusion Fifty two % of patients of nevus of Ota treated with 1064 nm Q-switched Nd:YAG laser showed more than 50% improvement.

Key words
Nevus of Ota, 1064nm Q-switched Nd:YAG laser, efficacy.

Introduction

Nevus of Ota (oculodermal melanocytosis, nevus fusco-caeruleus ophthalmo-maxillaris)[1] is a dermal melanocytic hamartoma that presents as bluish/ slate-gray hyper-pigmentation along the first or second branch of the trigeminal nerve.[2] In 1939, Ota from the University of Tokyo, described it[3] and since then, this melanocytic nevus has been widely known as Nevus Of Ota. Most cases of Nevus of Ota are unilateral (90%) while bilateral cases are rare (5-10%).[4]

Nevus of Ota is commonest in Asian patients and affects between 0.014% and 0.034% of the Asian population.[5] The age of onset is bimodal, with larger peak at birth or soon after and a smaller peak at adolescence. It may involve the sclera. The pigmentation varies and can be dark brown to blue to black-blue.[6] The condition is more common in females, with a male-female ratio of 1:4.8.[7]

Prior to the advent of laser therapy, treatment

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options for nevus of Ota were limited. The Q-switched Nd:YAG lasers have changed the way we approach the condition and have become the mainstay of therapy.[8] The Q-switched lasers produce ultra-short bursts of laser light that specifically targets the melanosomes in the dermal melanocytes.[9] The pulse duration of these lasers is typically in nanoseconds and it closely matches the thermal relaxation time of the target (melanosomes). The Q-switched laser treatment is based on Anderson and Parish's theory of selective photothermolysis. This states that the laser light must be of a wavelength that is well absorbed by the target chromophore and not the surrounding structures.[10]

Various studies have been conducted internationally to determine the efficacy and safety of Q-switched Nd:YAG 1064nm in patients of Nevus of Ota. A study carried out in India in which patients were treated with 6 sessions on an average of 8 weeks interval, showed >60% improvement in 66% of patients.[1] In another study by Kar *et al.* near total improvement was seen in 8%, marked improvement in 22%, moderate improvement in 38% and 32% patients reported less than 25% clearing of the lesion.[10]

Nevus of Ota can cause cosmetic disfigurement and negative impact on quality of life of patients. However there is scarcity of published literature from our local population, so this study was planned to evaluate the treatment option of Q-switched Nd:YAG laser which is a non invasive treatment modality for the Nevus of Ota in our population with skin type III-V.

Methods

A clinical trial was conducted in department of Dermatology, Unit-II, KEMU/ Mayo Hospital, Lahore March to September, 2016. After approval from ethical review board a sample size of 100 patients was calculated with 95% confidence interval, 8% margin of error taking frequency of marked improvement of 22% in nevus of Ota with 1064 nm Q switched Nd: YAG laser treatment. (Kar *et al.*[10]). Subject with age range of 16- 40 years of either gender with Fitzpatick skin types III to V, having either unilateral or bilateral and both congenital or acquired forms of Nevus of Ota were selected through non-probability/ purposive sampling technique. Patients who were pregnant and lactating, had history of cosmetic procedures in the treatment area within last 12 months or who were using topical retinoids or hydroquinones within last 3 months, patients with history of known photosensitivity, allergies, endocrinopathies, or having coexisting rosacea, melasma, keloids or hypertrophic scars (on clinical examination) at site of lesion were excluded from the study.

After written informed consent, patient's detailed demographic profile was recorded on predesigned proforma. Baseline photographs and Pigment area and Severity Index (PSI) score were recorded **(Table 1)**. Treatment area was cleansed with soap and water and dried. No anaesthesia was required. Both the doctor and patient wore eye shields during treatment. Therapy was started with 1064nm Q-switched Nd:YAG laser at fluence of 500-600 V and frequency of 5 Hz. The hand piece was held perpendicular to skin surface and 2-3 passes were given. The end point was immediate whitening/ graying of hair or lesion. In order to reduce inflammatory reactions, topical sunblock with SPF 60 was applied during the day time till next treatment session. A total of 10 sessions at 2 weeks interval were given to each patient.[4] Final assessment was done after 4 weeks of last session. Photographs and PSI score was taken again to compare with baseline and %age reduction in PSI which was calculated by the formula:

Table 1 Pigment area and Severity Index (PSI).

Area (the extent of pigmented lesions on the face)
0= no involvement, 1= less than 10% involvement, 2= 10-29%, 3= 30-49%, 4= 50-69%, 5= 70-89%, 6= 90-100%
Darkness (depends on colour)
0=absent, 1=slight(brown), 2=mild(grey), 3=marked (greyish blue), 4= maximum (bluish black)
Density (No. of speckles/ unit area)
0= minimal, 1= slight, 2= mild, 3= marked, 4= maximum
PSI Score (0-48) = (Darkness + Density) x Area
Percentage reduction= PSI pretreatment-PSI post treatment / PSI pretreatment X 100

Table 2 Demographic and clinical characteristics of subjects.

Variables (n=100)	Frequency (%age)
Age	
16-31	86 (86%)
31-40	14 (14%)
Gender	
Male	15 (15%)
Female	85 (85%)
Duration (years)	
<15 years	45 (45%)
>15 years	55 (55%)
Marital Status	
Married	25 (25%)
Unmarried	75 (75%)
Fitzpatrick Skin Type	
III	10 (10%)
IV	77 (77%)
V	13 (13%)
Efficacy (> 50% improvement)	
Yes	
No	

A percentage reduction of >50% was taken as efficacious **(Table 1)**.

Data entry and analysis was done by using SPSS 20. Data was stratified for age, gender, baseline PSI score, duration of lesion and skin type. Chi-square test was used post-stratification with p value < 0.05 considered as significant.

Results

In this study, mean age of the patients was 24.35±5.70 years. There were 15 males (15%) and 85 females (85%). Majority of the patients had duration of lesion > 15 years (55%). There were 25 married (25%) and 75 unmarried patients (75%). Most of the patients presented with skin type IV (77%) **(Table 2)**. All patients enrolled completed 10 treatment sessions 2 weeks apart. Percentage reduction of greater than 50% from baseline was seen in 52 of the 100 patients enrolled. Therefore treatment with Q-switched Nd:YAG laser was considered efficacious in 52% of the patients. Stratification with regard to age, gender, duration of lesion and skin type was carried out and presented in **Table 3**.

Table 3 Stratification of results of 100 patients based upon age, gender, duration of disease and Fitzpatrick's skin type.

Variables n=100		*Efficacy (>50% improvement)*		*Total*	*Chi-square P value*
		Yes	*No*		
Age	16-30 years	46 (53.6%)	40 (46.4%)	86 (100.0%)	X^2 = .545
	31-40 years	6 (42.8%)	8 (57.2%)	14 (100.0%)	P = .460
Gender	Male	4 (26.6%)	11 (73.4%)	15 (100.0%)	X^2 = 4.539
	Female	48 (56.4%)	37 (43.6%)	85 (100.0%)	P =0.033
Duration	< 15 year	28 (62.2%)	17 (37.8%)	45 (100.0%)	X^2 = 3.425
	> 15 year	24 (43.6%)	31 (56.4%)	55 (100.0%)	P=0.064
Fitzpatrick Skin Type	II	5 (50.0%)	5 (50.0%)	10 (100.0%)	X^2 = 12.089 P =0.002
	III	46 (59.7%)	31 (40.3%)	77 (100.0%)	
	IV	1 (7.7%)	12 (92.3%)	13 (100.0%)	

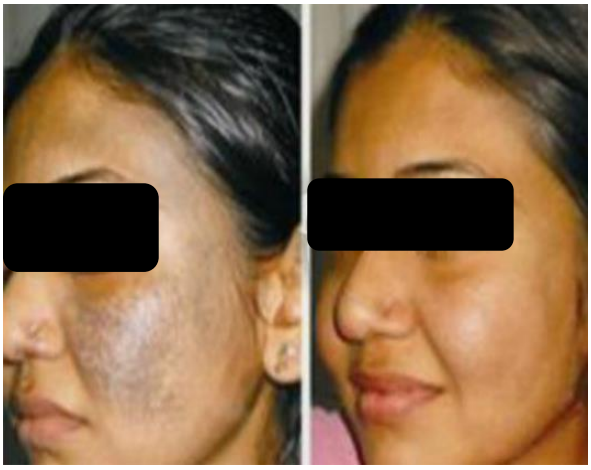

Figure 1

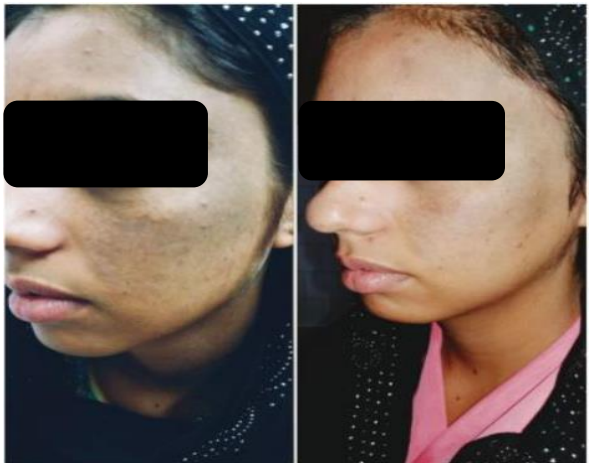

Figure 2

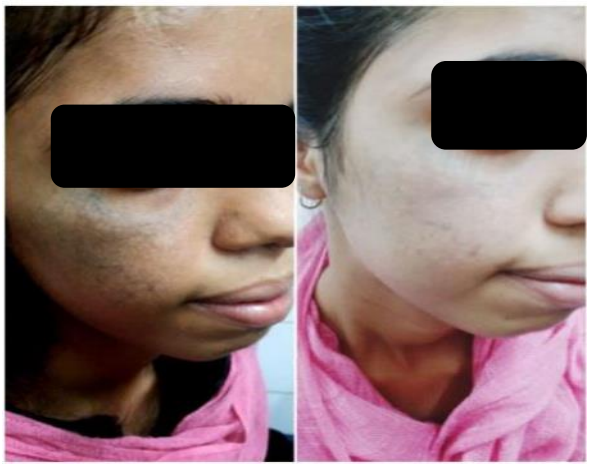

Figure 3

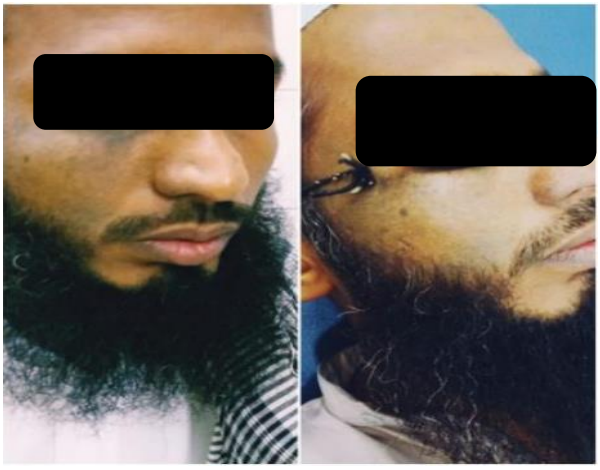

Figure 4

Figure 1-4 Before and After treatment with Q-Switched Nd:YAG Laser 1064 nm for the nevus of Ota.

Discussion

Traditionally, the treatment options for nevus of Ota included cryotherapy, dermabrasion, surgical excision and cosmetic camouflage. Advent of Lasers revolutionized the treatment of various diseases including pigmentary disorders like nevus of Ota. After the treatment, hyperpigmentation is not very common, making Q-switched Nd:YAG a good treatment option for the nevus of Ota. In our study, majority of the patients were between the ages of 16-31 (86%) with a female predominance (85%). This was comparable to the study by Solanki J *et al.* Wang BQ *et al.*[7]

Most of the patients were of skin type IV which was similar in the studies from India.[1] However various studies from China showed majority of patients with skin type III.[2] This is in accordance with the predominant skin type in that population. Majority of patients had duration of disease >15 years of age. In our study, all patients responded well to treatment with 52% patients showing >50% clinical improvement as determined by %age reduction in PSI score. Results of our study were comparable to that of Aurangabadkar.[1]

When we stratified our results on the basis of age, gender, Fitzpatrick skin type and duration

of disease, it was seen that there was no statistically significant difference of response between different age groups and duration of disease. However when we cross tabulated results according to Fitzpatrick skin type, it was seen that the clinical improvement was considerably lower in patients with skin type V (8%) as compared to skin type III and IV (50%) and (60%) respectively. This was comparable to the study by Kar and Gupta.[5] Similarly a statistically significant difference was observed in female and male patients with percentage improvement of 56% and 27% respectively (p value= 0.033).

The strength of our study was its large sample size. Q-switched Nd:YAG laser had a significantly higher successful rate in different skin type and gender in our population. Majority of our patients tolerated the treatment well with very few side effects like transient erythema and burning. Therefore 1064 nm Q-switched Nd:YAG is a valuable addition to the available therapies for nevus of Ota which is a challenging condition to treat. The main limitation of our study was that the patients were not followed up to look for recurrence and lack of control with convention treatment.

Conclusion

Our study concluded that 1064 nm Q-switched Nd:YAG laser represents a safe and effective method of treatment for nevus of Ota resulting in more than 50% improvement in 52% of treated patients.

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