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Original Article

Comparison of efficacy of cryotherapy vs Q-switch Nd:YAG Laser in the treatment of solar lentigines

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Abstract

Background Solar lentigines are local and benign proliferation of melanocytes at the dermo-epidermal junction. These lesions are several, yellow or brown, oval or round macule with obvious margins present at areas such as back of the hands, forearm, and face, which are exposed to sunlight. Physical therapy of solar lentigines includes cryotherapy, laser therapy, pulsed light, and chemical peels.

Methods A total of 120 patients (60 patients in each group), fulfilling inclusion and exclusion criteria, were enrolled in the study. Group A was treated with cryotherapy (liquid nitrogen by applying it with cotton swab at -20 ^{o}C). Cryotherapy was done on every 15th day for a total of 8 sessions. Group B was treated with Q-switch Nd: YAG Laser for a total of 8 sessions. A five-point grading scale was used to assess the efficacy of both treatments.

Results Mean age of patients in group A was 38.48±10.79 and in group B was 39.23±11.31 years. Statistically significant difference in efficacy was found in Q-switch Nd: YAG laser group as compared with cryotherapy (p=0.007). Most of the patients in both groups showed grade 2 (Fair) and grade 3 (Good) response.

Conclusion Q-switch Nd: YAG laser therapy is superior to liquid nitrogen cryotherapy for the treatment of solar lentigines.

Key words
Solar lentigines, cryotherapy, Q-switch Nd: YAG.

Introduction

Solar lentigines are common among Asians and are caused by an increased number of epidermal melanocytes producing excessive quantities of melanin due to excessive sun exposure.[1] The lesions are usually brown, but the color may range from yellow-tan to black. Solar lentigines slowly increase in number and in size. Although these lesions are most common in individuals 30-50 years of age, they are now seen in younger individuals as well because of their increased exposure to sun tanning and the use of artificial sources of UV light. Patients with these pigmented lesions often present in dermatology outpatient department because of their cosmetic concern.[2]

Solar lentigines are seen in about 49% of all age groups of Indo-Pak population, while its extent in different age groups is 30% in 20-29 years, 60% in 30-39 years, 43% in 40-49 years and 60% in 50-59 years.[2]

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There are two types of treatment: (1) physical therapies, which include cryotherapy, laser therapy, intense pulsed light (IPL), and chemical peeling and; (2) topical therapies such as hydroquinone and tretinoin. Cryotherapy is currently the first-line therapy for solar lentigines. It is inexpensive and effective; its side effects are post-inflammatory hyperpigmentation (PIH) that limits its use especially in darker Fitzpatrick's skin types. Multiple types of lasers (e.g., pulsed dye laser (PDL), Cl-switched ruby, Q-switch Nd: YAG) have been used in the treatment of solar lentigines because of the broad absorption spectrum of melanin (351-1064 nm).[3,4]

Cryotherapy is first line therapy and is easily available but it is not widely used in our setup due to its potential side effect of post inflammatory hyper-pigmentation, which is also reported by, Q-switched Nd: YAG Laser.

We performed this study to compare the results of cryotherapy with that of Q-switch Nd: YAG Laser. To the best of our knowledge, there are no local studies available comparing the effects of these two modalities in the treatment of solar lentigines.

Methods

This randomized controlled trial was conducted in the Department of Dermatology, Services Institute of Medical Sciences/ Services Hospital Lahore, during the period from May 2017 to November 2017. 120 clinically diagnosed patients of solar lentigines of either sex, age ranging from 20-65 years, having Fitzpatrick's skin type III-IV were included in the study after taking written informed consent. Patients receiving LASER treatment and topical treatment in the last two months were excluded from the study. Patients with known photosensitivity or taking photosensitizing medication like psoralen, piroxicam, dispirin or having history of oral retinoid treatment within the previous six months were also excluded. Other exclusion criteria included pregnant and lactating females and patients of melasma, fixed drug eruption and ashy dermatosis.

Pretreatment evaluation was done with detailed history, clinical examination and colored photographs were taken. Patients were randomly allocated to two groups. Group A was treated with cryotherapy (liquid nitrogen by applying it with cotton swab at 20 °C). Group B was treated with Q-switch Nd: YAG.

All patients used a sunscreen. The patients in group A received cryotherapy with liquid nitrogen (application with a small-tip cotton applicator to each lesion for 5 seconds). Pre-treatment complete blood count and coagulation profile was done. Patients were treated at 15th day, 30th day, 45th day, 60th day, 75th day, 90th day, 105th day, 120th day (total of 8 sessions). The grading scale consisted of rating the degree of lightening (percentage of clearing) as designated in five-point grading scale by Todd *et al.*[5] i.e. 0-25% graded as Poor (lightening of 2 lentigines), 26-50% as Fair (lightening of 4 lentigines), 51-75% as Good (lightening of 6 lentigines), 76-90% as Excellent (lightening of 8 lentigines) and 91-100% as clear (lightening of all lentigines). Patients in group B received doubled Q-switched Nd: YAG lASER (wavelength, 532 nm; 2.5 J/cm^2; 5 Hz; 30 nanoseconds; 3-mm spot) for total 8 sessions. Grading score is applied in similar way to that of cryotherapy. The treatment efficacy of both groups was calculated in terms of decrease in number, size and pigmentation of the lentigines based on the improvement of greater than 50% by using photographs. The data was observed and graded on five-point scale. Efficacy was assessed after 8 sessions (4 months) of treatment in both groups.

Results

A total of 120 patients, 60 cases in each group, were studied. Patients ranged between 20-65 years. Majority of the patients were between 20-40 years of age in both groups. Mean age was 38.48±10.79 and 39.23±11.31 in group-A and B, respectively. There were 17 males (28.3%) in group-A and 15 males (25%) in group-B while 43 females (71.7%) in group-A and 45 females (75%) in group-B.

Mean duration of disease in group A was 1.35±0.48 and in group B 1.42±0.49 years. Skin type IV was more common in both groups (96.7%) of patients in group A and 95% in group B).

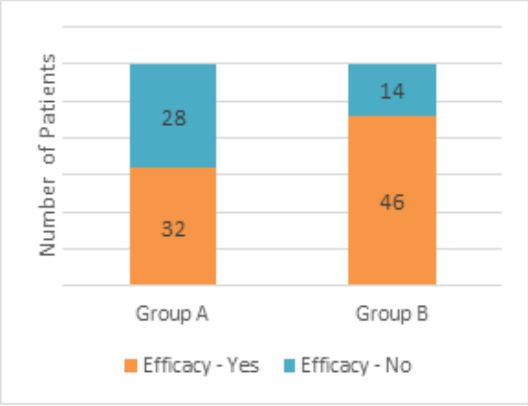

Figure 1 Efficacy of Cryotherapy & Q-switch Nd: YAG laser (Chi square = 7.179, p value = 0.007)

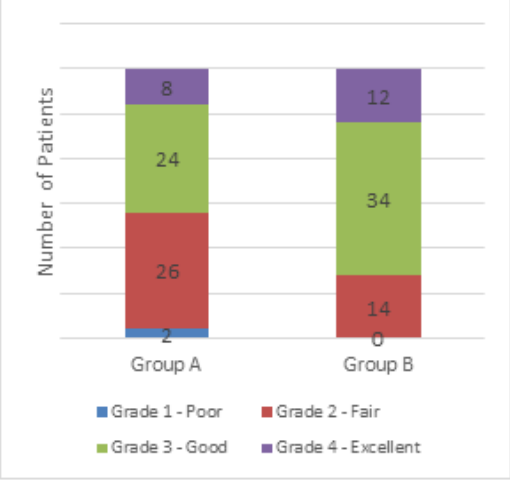

Figure 2 Distribution of patients by grades

Table 1 Stratification by Age

Age (Year)	*Group*	*Efficacy*		*Total*	*P value*
		Yes	No		
20-40	Group-A	19	13	32	0.047
	Group-B	30	07	37	
41-65	Group-A	13	15	28	0.097
	Group-B	16	07	23	

Table 2 Stratification by gender

Gender	*Group*	*Efficacy*		*Total*	*P value*
		Yes	*No*		
Male	Group-A	7	10	17	0.149
	Group-B	10	05	15	
Female	Group-A	25	18	43	0.026
	Group-B	36	09	45	

Table 3 Stratification by duration of disease

Duration	*Group*	*Efficacy*		*Total*	*P value*
		Yes	*No*		
1 year	Group-A	20	19	39	0.004
	Group-B	29	06	35	
2 year	Group-A	12	9	21	0.447
	Group-B	17	8	25	

Table 4 Stratification by type of skin

Type of skin	*Group*	*Efficacy*		*Total*	*P value*
		Yes	No		
Type III	Group-A	0	2	2	0.025
	Group-B	3	0	3	
Type IV	Group-A	32	26	58	0.023
	Group-B	43	14	57	

Statistically significant difference in efficacy was found in Q-switch Nd: YAG group as compared with cryotherapy (p=0.007) **(Figure 1)**. Most of the patients in both groups were having grade 2 (Fair) and grade 3 (Good) improvement. Stratification with regard to age, gender, duration of disease and type of skin was also carried out.

Discussion

Solar lentigines are the most common hypermelanotic lesions of photoaged skin. They occur from age 30 onwards as benign hyperpigmented lesions on chronically sun-exposed areas of the face, back of the hands, and extensor surfaces of the forearms. The lesions

vary in size from 0.2 to 2.0 cm; the intensity of their pigmentation is not related to the amount of solar radiation and they do not fade in winters. The spots increase in number with advancing age. Although lentigines are not premalignant lesions, they are significant cosmetic nuisance for many middle-aged and elderly patients.[6,7]

In current study patients age range was between 20-65 years. Mean age was 38.48±10.79 and 39.23±11.31 years in group-A and B, respectively. In a study carried out by Ghaninejhadi *et al.*[8] mean age was 54.2±23.3 which is greater than mean age of our patients, because age range of patients in the study conducted by Ghaninejhadi *et al.*[8] was from 39 to 71 years. The persons in this age group are more exposed to UV radiations because of more outdoor activities. It is well-known that these spots occur mainly because of chronic UV exposure. Exposure to UV radiation results in increased melanin production and may lead to the development of these hyperpigmented lesions. Ghaninejhadi *et al.*[8] demonstrated that majority of the patients were females which is also consistent with our study. In another study by Katoulis *et al.*[9] revealed that females were in vast majority. In addition to UV exposure, use of oral contraceptive pills and progesterone are additional risk factors in females and that is why it is seen more in females.

In our study duration of disease had no effect on efficacy of these two modalities and these results are similar to the study conducted by Jarrat *et al.*[10] who also demonstrated that skin pigmentation when treated by different modalities were not affected by duration of disease.

In our study, in group A (cryotherapy) efficacy was seen in 53% patient with 40% patient showed good (grade-3) response and 13% patient showed excellent (grade-4) response, while in the study conducted by Todd *et al.*[5] efficacy seen in cryotherapy group was 83% with 20% patient showed good (grade-3) response, 44% patient had excellent (grade-4) response, and 21% patient showed clear (grade-5) response. This significant change in efficacy between two studies is due to the fact that Asian skin (Fitzpatrick's skin type III and IV)[3] contain greater melanin pigment and show more photodamage, pigmentary disorder and resistance to treatment. Efficacy of these modalities is comparatively less than in Fitzpatrick's skin type I and II which were included in study of Todd *et al.*[5]

In our study, treatment efficacy in group B (Q-switch Nd: YAG Laser) was seen in 77% of patient with 57% showed good (grade-3) response and 20% patient had excellent (grade-4) response. Whereas, efficacy was seen in 97% of the patients in Q-switch Nd:YAG Laser in the study conducted by Todd *et al.*[5] where 10% patient showed good (grade-3) response, 46% patient showed excellent (grade-4) response and 37% patient had clear (grade-5) response. This significant change between the efficacies of these two studies is due to difference in skin type.

In current study, efficacy of Q-switch Nd: YAG laser was better when compared with cryotherapy in the treatment of solar lentigines with a p-value of (0.007) which is considered statistically significant. Our results are comparable with the study of Todd *et al.*[5] which also demonstrated that Q-switch ND: YAG laser is better than cryotherapy.

Conclusion

In the light of this study, it is concluded that laser therapy is superior to liquid nitrogen cryotherapy for the treatment of solar lentigines and hence, Q-switch Nd: YAG laser should be

frequently used as a reliable treatment option for solar lentigines.

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