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Efficacy of Q- Switched Nd: YAG Laser in Treatment of Melasma

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Abstract

Background: Melasma is a common acquired hyperpimented disease especially in darker skin colored, characterized by irregular light to gray – brown macules and patches involving sun exposed area of skin, The Q-switched Nd-YAG 1064nm laser has a longer wavelength , which is well absorbed by melanin and to less extent by hemoglobin ,making it generally safer in darker skin type because it spares injury to the epidermis to a greater degree than shorter wavelengths. **Objective:** To evaluate the efficacy and safety of Q switched Nd-YAG 1,064 nm laser in treatment of melasma. **Methods**: This study was done in period between early August 2010 to end of March 2011in private clinic in Baquba city. forty patients participated in this study, The laser parameter were Q-switched Nd-YAG laser 1064nm, spot size 3mm, frequency 4 Hz, fluence from 600-900mJ, the treatment sessions done at 3 weeks intervals for 5 sessions ,we calculate MASI score for each patient at each visit. **Results:** Thirty four patients (4 males, 30 females) completed the study. Six patients defaulted from the study for unknown causes. Patients ages ranged from 21 years to 43 years with mean 26 SD3.5 years, mean of MASI score gradually diminish till reach statically significantly at fourth session. no permanent pigmentary adverse effects observed. **Conclusion**: We can conclude that Q-switched Nd:YAG laser is an effective and safe method for therapy of melasma.

Keywords: Melasma, melanin , Q-switched Nd: YAG laser.

فعالية الليزر ان دي ياك في علاج مرض الكلف

د.علاء الدين خورشيد مراد مستشفى بعقوبه التعليمي
د.علي فاضل السعدي مستشفى بغداد التعليمي

يعتبر مرض الكلف من الامراض الصبغيه الشائعة خاصه لذوات البشره الغامقه يتميز بوجود بقع غامقه خاصه في المناطق المعرضة للشمس.ويعتبر الليزر الان دي ياك من الليزرات التي تمتص من قبل صبغه الميلانين وعدم الامتصاص من قبل الجزيئات الاخرى القريبه .لذا صممت هذه الدراسه لبيان فعاليه هذا النوع من الليزر في علاج مرض الكلف.تم اجراء الدراسه في العياده الخاصه في مدينه بعقوبه على 34 مريض ومريضه للفتره من اب 2010 ولغايه اذار 2011.أستخدام في هذه الدراسه جهاز ليزر نوع ان دي ياك ذات طول موجي 1064 نانو متر وهرتزيه 4 وقطر3 مليمتر وطاقه 600-900 مليجول لكل سنتيمر مربع وبواقع جلسه واحدة كل ثلاث اسابيع وبواقع خمسه جلسات.كانت اعمارالمرضى من 21-43 سنه تم التقيم باستخدام قياس ماسي في البدايه ولكل جلسه.وتم ملاحضه هبوط معدل القياس بعد كل جلسه وبدأت الاهميه الاحصايه بعد الجلسه الرابعه ولم تسجل أعراض جانبيه مهمه.
لذا يعتبر ليزر الن دي ياك فعال وامن لعلاج مرض الكلف.

Introduction

Melasma is a common acquired symmetric hypermelanos is characterized by irregular light to gray –brown macules and patches involving sun exposed area of skin. [1]

It tend to affect darker-complexioned individuals, especially East, West, and South-east Asian, Hispanics, and black persons who live in area of

intense sun exposure and who have Fitzpatrick skin types IV and V.[2].

It is very common in women but occasionally seen in men. It can be a source of embarrassment in men because of its unsightly appearance and the social stigma of being categorized as a disease in pregnant women [3]. Melasma in male patients shares similar clinicohistologic characteristics with its female counterpart. There are some different points including the pattern, with malar being more common in men. [4] Three types of melasma exist, as classified according to their distribution on the face, which include centrofacial, malar, and mandibular patterns. [5] Another classification of melasma according to location of pigments as epidermal, dermal, mixed type.[6] By using woods light the pigmented area appear more intensify in epidermal type, and not intensify in dermal type, in mixed type wood s light intensify area and other unchanged.[7] Genetic backgrounds, chronic exposure to ultraviolet radiation, and female sex hormones have been implicated as the main causes of melisma.[8] Recently, involvement of inflammatory processes in melasma development has also been considered.[9] Therapeutically, a sunblock with broad-spectrum ultraviolet coverage should used daily. Bleaching creams with hydroquinone are the gold standard. Tretinion, Methimazole, azelic, kojic acid, vitamin C, and arbutin also used.[2] Recently oral tranexamic acid. [10] And topical tranexamic acid. [11]

Various surgical procedures, such as peel and light-based treatment, Intensive pulsed light can improve, but high relapse rate, pulse dye laser may enhance with combination topical treatment. [2]

The Q-switched Nd-YAG laser1064nm has a longer wavelength , which is well absorbed by melanin and to less extent by hemoglobin ,making it generally safer in darker skin type because it spares injury to the epidermis to a greater degree than shorter wavelengths. [12] the use of 1064nm Q-switched Nd-YAG at subthreshold photothermolysis fluences (<5 Joul\cm^2),resulting in reduction of epidermal and dermal pigmentation with no recurrences at one year follow up. [13]

This study was done to evaluate the efficacy and safety of Q switched Nd-YAG 1,064 nm laser in treatment of melasma.

Patients and Methods

This study was done in the private clinic in Baquba city in period between early August 2010 to end of March 2011.Fourty patients with melasma participated in this study, patients age ranged from 21- 45years: thirty six were females and fourmales, six patients had Fitzpatrik skin type III ,and 14 had skin V.table1

All patients were healthy, and none had any dermatological , endocrinology, hepatic, or any other disorder except melasma. We excluded any patient take any treatment for melasma in the last 3 months or pregnant women. All patients provided fully understood the purpose of the study. The instrument use in this study is Q-switched Nd-YAG Laser which is solid state laser made in china by Diamond company with wavelength 1064nm and pulse duration 6-10 ns, the treatment parameter are (Q-switched Nd-YAG laser of 1064nm, spot size 3mm, frequency 4 Hz, fluence from 600-900mJ) the difference in fluence occurs because we usually started with 600mJ and we increase it gradually according to response.

The procedure include prepare the patients to laser and examined the area of melasma for percentage of area involve ,darkness of the area and homogenicity to calculate MASI score then clean the area, take photograph before any session and after complete the study for comparison.

The treatment session take from 10 to 20 minutes, according to size of the lesion, we do 5 sessions 3 weeks apart. For patients evaluations and side effects such asitching, redness, dryness, postinflammatory pigmentation.

Types of evaluations

A-clinical evaluation: all patients were examined clinically then used wood light to determine the type of melasma (epidermal, dermal, mixed). then calculate MASI (melasma area severity index) score for each patient at beginning and then at each visit B-Subjective method: depend on recording improvement in patient satisfaction during course of intervention and graded as, Grade 0=no response, Grade1= moderately partially. Grade 2 greatly but not fully satisfied, Grade 3 fully or completely satisfied.

We use non-contact method in horizontal pattern with hand piece moving across the lesion in the same rate. The laser hand-piece put in perpendicular manner to the lesion and move slowly till the area hit by laser beam. The laser cause whitish (popcorn) frosting over the lesion, we advise the patient not expose to sunlight at same day and use wide- spectrum sunblock when outdoor after that.

For safety measure: the laser employed was class 3B all safety measure was done.

We follow up the patients monthly for 3months after finishing the treatment for recording any relapse.

Results

Thirty four patients (4 males, 30 females) completed the study. Six patients defaulted from the study for unknown causes. Patients ages ranged from 21 to 43 years with mean 26SD3.5 years, according to Fitzpatrick classification 10 with skin type III and 24 with skin type IV. By using wood s light, 10 patients with epidermal type, 6 patients with dermal type,18 patients with mixed type as show in figure (1)

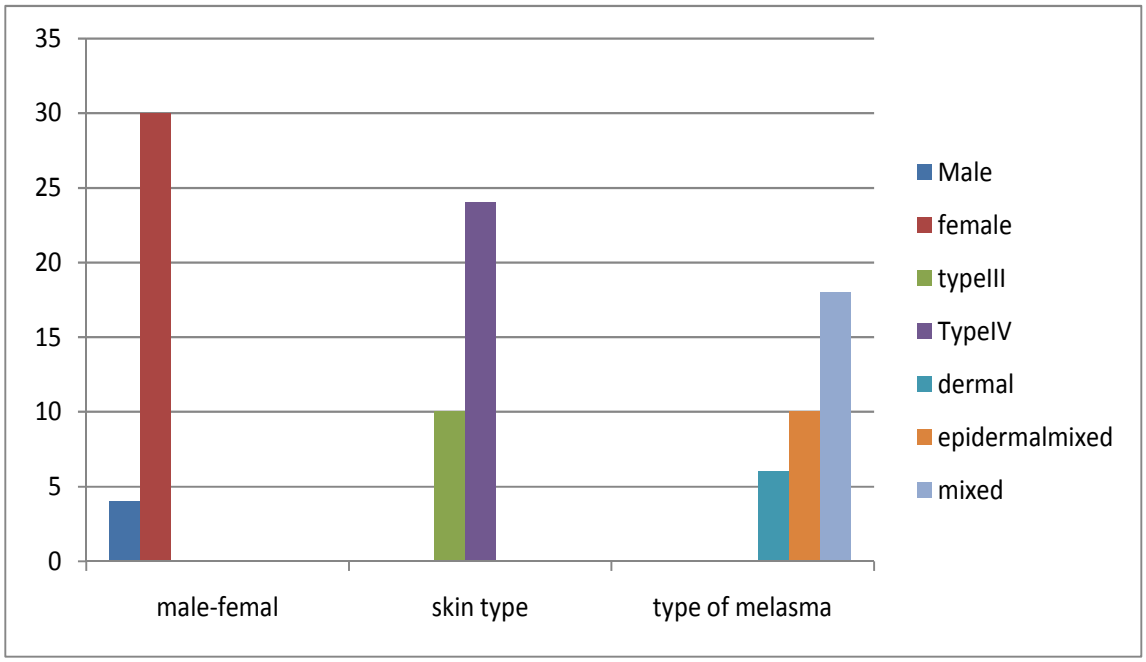

Figure (1); Distribution of patients according to sex, skin types, and melasma types.

At beginning of study the MASI score range from minimum 8 to maximum one 26 with mean SD= 18.8 SD 4.65.

At 3 week intervals the mean of MASI score of patients gradually decrease as show in figure (2), the mean of MASI score started to decrease from 18.8 to 17.3,10.1,15.7, 14.1, 12.2 ,at the visits from the first visit to sixth visit respectively.

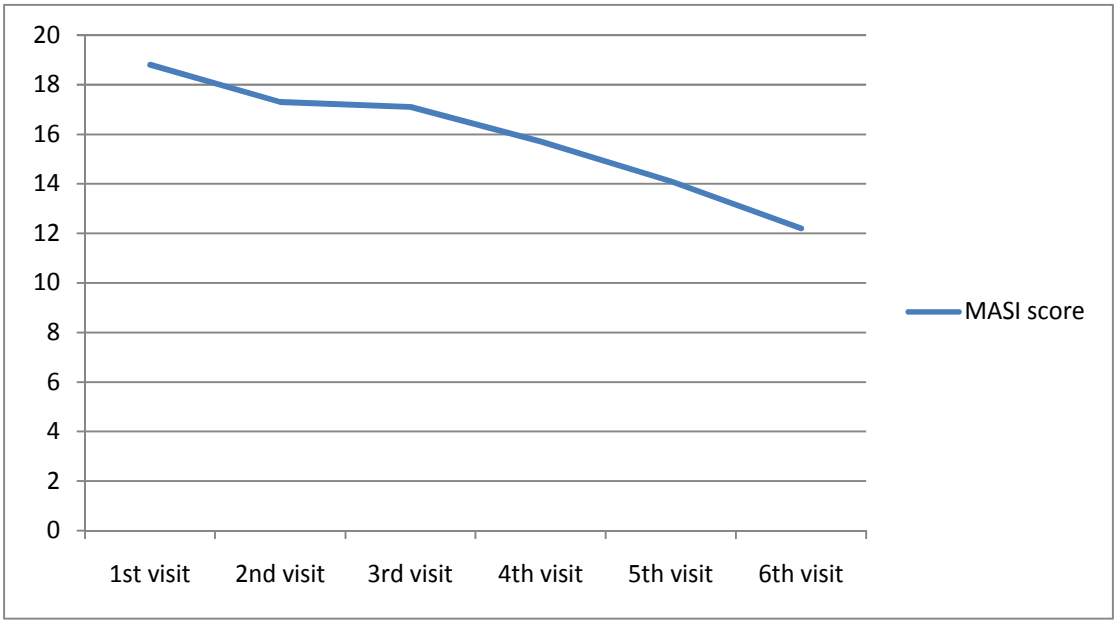

Figure (2); Mean of MASI score at each visit.

From statistical point of view and by using t-test to compare the mean MASI score before starting the study with mean MASI score at each visit, P-value statistically significant at the 5th and 6th sessions in which the P-value were 0.0069 and 0.0002 respectively.

The mean of MASI score for the patients with epidermal type didn't differ from mean of mixed or dermal types from statistical point view.

Patients satisfactions at visit 1st and 2nd visits were all grade 0 (not satisfied at all), at the 3rd visit only4 patients moderately, partially satisfied (grade 1). at 4th visit 10 patients moderately (grade 1) satisfied at visit 5th 12 patents (grade 1) moderately satisfied and 4 greatly but not fully satisfied (grade 2), at last, 6th visit 14 partially (grade 1) and 5 patients not fully satisfied and 3 patients fully (grade 3) satisfied as shown in figure (3).

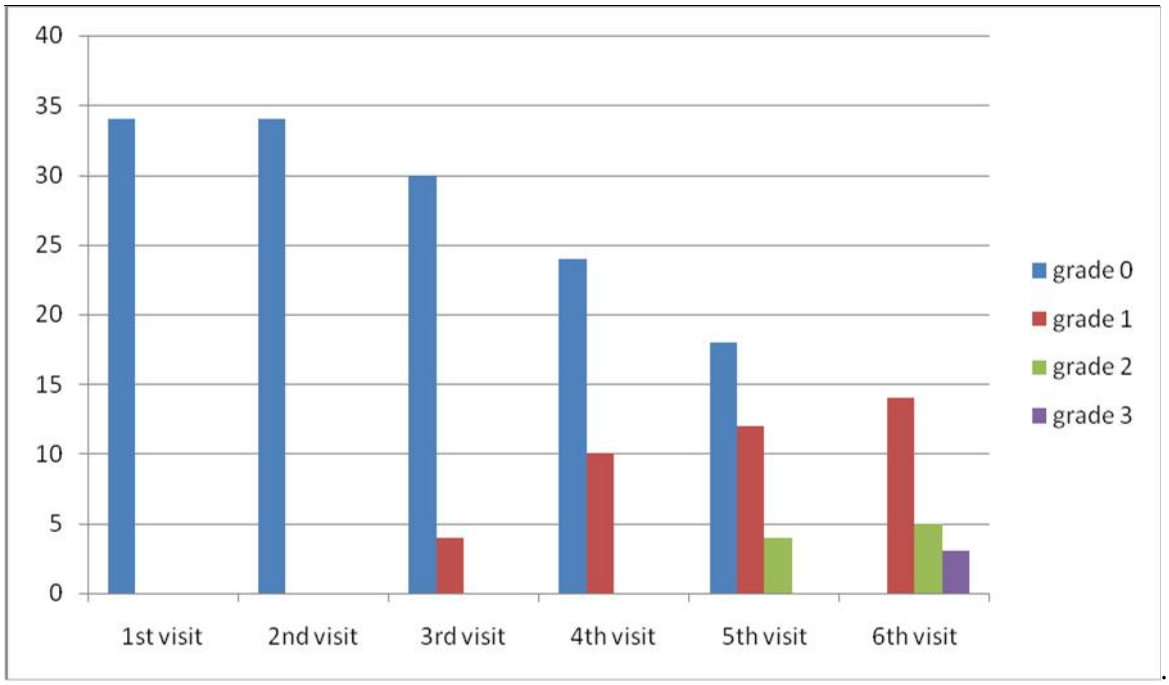

Figure (3): Patients satisfaction.

All patients feel burning and stinging through the sessions and till10-20 minutes after treatment. Only 20 patients developed erythema that disappeared during 48 hours. Ten patients developed a mild degree of dryness, and scaling during the course of study.

Most common side effects observed during the study is erythema which followed whitish (popcorn)frosting over the lesion, then become a little reddish and warm after 15 minutes became like a sunburn. Post inflammatory hyperpigmentation occurred in 4 patients and disappeared 1-2 months after finished the treatment spontaneously.

Discussion

Melasma is a common cosmetic problem in the world. Because of its refractory and recurrent nature, especially the mixed or dermal types, Melasma is often difficult to treat. Many topical remidies, peeling, phototherapy, and laser used to treat a melasma with varying degree of success and adverse effects.

Q switched Nd-YAG laser treatment for benign pigmentary lesions, the laser targets melanin particles found within melanocytes, keratinocytes, or dermal melanophages, and multiple treatment required, recently Polnikorn [13]described a new technique of repetitive subthreshould pulsed 1,064nm Q switched laser that was effective for the treatment of refractory dermal melasma. The objective of the current study was to explore the effectiveness and safety of multiple treatments with 1,064nm Q switched Nd-YAG laser to treat melasma in Iraqi patients.

Although we used fluence from 600mJ to 900mJ/cm^2 the statistical significant improvement started from the 5th visit, but no case reach to complete eradicated or more than half of the lesion disappear, maximum reduction in MASI score is to half till end of study,

we choose this fluence to avoid more adverse effects such as hypopigmentation and hyperpigmentation which occurred in almost previous studies even with not very high energy.[14] And for this reason we cannot continue for more than five sessions, the short pulse duration used which is 6-10 nanosecond which is shorter than the chromophores (melanosomes) thermal relaxation times , this lead to maxima target destruction with minimal collateral thermal damage.

The exact mechanism of decrease the MASI score may result from formation of plasma due to short pulse duration or and small diameter of laser beam resulting high fluence within very short time, this lead to plasma formation and destruction of melanosome, or may result from photodisruption of melanosome in epidermis, and the destructed melanosomes removed from the body by normal transit of keratinocytes to stratum corneumthen shed from horny layer melanin in dermis take by melanophages.

All side effects are transient, and do not leave any permanent cosmetic problems. Therefore, we can conclude that Q-switched Nd:YAG laser is an effective and safe method for therapy of melasma .and we recommended to use it alone as mono therapy or combed with other mode of therapy such as topical to increase cure rate.

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