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A comparative analysis of carbon dioxide laser technique and derma roller therapy in post-acne scars patients

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Abstract
Background: Acne leads to significant morbidity that is associated with residual scarring and psychological disturbances such as poor self-image, depression, and anxiety, which leads to a negative impact on quality of life. The present study was conducted to compare fractional carbon dioxide (CO_2) laser technique (FCLT) and derma roller therapy (DT) in patients with post-acne scars.
Materials & Methods: 78 patients with post-acne scars of both genders were divided into 2 groups of 39 each. Group I patients was treated with derma roller therapy and group II with fractional CO_2 laser every 4 weeks. An objective and subjective baseline assessment was done for each patient using global acne scarring classification.
Results: Group I had 19 males and 20 females and group II had 16 males and 23 females. Response of treatment was satisfactory seen in 9 in group I and 4 in group II, good in 10 in group I and 6 in group II, very good in 14 in group I and 13 in group II and excellent in 6 group I and 16 in group II. The mean objective score at baseline in group I was 31.4 and at follow up was 16.1 and in group II at baseline was 27.2 and at follow up was 15.1. The difference was significant ($P< 0.05$).
Conclusion: Both Carbon dioxide laser and dermaroller technique found to be equally effective in patients with post acne scars.

Keywords: Acne, fractional CO_2 laser, scars

Introduction
Acne vulgaris is a common skin disease presenting as non-inflammatory lesions, inflammatory lesions and varying degrees of scarring, affecting mostly the face but also the back and chest. Acne leads to significant morbidity that is associated with residual scarring and psychological disturbances such as poor self-image, depression, and anxiety, which leads to a negative impact on quality of life [1]. Acne scars can be classified into three main categories, depending on whether there is a net loss or gain of collagen atrophic; hypertrophic and keloidal scars respectively. Atrophic scars can be further sub-classified into ice pick; rolling; and box scars. Scar classification is important as it can help guide treatment options [2].
Post-acne scarring is one of the most common causes of disfiguring scars over the face. Studies have shown that nearly 80% of patients with acne have some scarring and 50% have clinically relevant scarring. Acne scaring is commonly seen in adolescence and young adults causing marked psychological distress. Dermatology life quality index (DLQI) in these patients is significantly lower than in patients without scars [3].
Various methods such as chemical peels, microdermabrasion, lasers - non-ablative, ablative lasers, fractional photo thermolysis (FP), techniques are used widely. The improvement in appearance of acne scars following fractional CO_2 laser is due to the combination of processes of healing that initiates new collagen deposition after ablation and collagen remodeling initiated by the zone of coagulation surrounding the ablated area. CO_2 lasers produce significant improvement at the cost of long recovery times and post-inflammatory hyperpigmentation. Micro needling fractional radiofrequency (MFR) is a recent procedure for managing scars and not lead to damage the epidermis [4]. The present study was conducted to compare fractional carbon dioxide (CO_2) laser technique (FCLT) and derma roller therapy (DT) in patients with post-acne scars.

Materials & Methods

The present study comprised of 78 patients with post-acne scars of both genders. All gave their written consent to be part of the study.

Demographic data such as name, age. gender etc. was recorded. Patients were divided into 2 groups of 39 each. Group I patients was treated with derma roller therapy and group II with fractional CO_2 laser every 4 weeks. An objective and subjective baseline assessment was done for each patient using global acne scarring classification. All findings were recorded and compared statistically using Mann Whitney U test. P value less than 0.05 was considered significant.

Results

Table I: Distribution of patients

Groups	Group I	Group II
Method	carbon dioxide laser	derma roller therapy
M:F	19:20	16:23

Table I shows that group I had 19 males and 20 females and group II had 16 males and 23 females.

Table II: Objective evaluation of patients

Response	Group I	Group II	P value
Satisfactory	9	4	0.01
Good	10	6	
Very good	14	13	
Excellent	6	16	

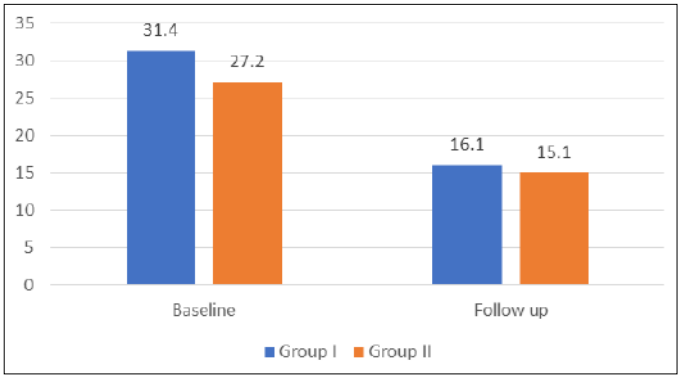
Table II, graph I shows that response of treatment was satisfactory seen in 9 in group I and 4 in group II, good in 10 in group I and 6 in group II, very good in 14 in group I and 13 in group II and excellent in 6 group I and 16 in group II. The difference was significant ($P < 0.05$).

Graph I: Objective assessment of patients

Table II: Mean objective score in both groups

Period	Group I	Group II	P value
Baseline	31.4	27.2	0.041
Follow up	16.1	15.1	

Table III, graph II shows that mean objective score at baseline in group I was 31.4 and at follow up was 16.1 and in group II at baseline was 27.2 and at follow up was 15.1. The difference was significant ($P < 0.05$).



Graph II: Mean objective score in both groups

Discussion

The pathogenesis of acne scars involves injury to the skin which initiates a chain of events leading to wound healing. The wound healing process progresses through 3 stages inflammation, granulation tissue formation, and matrix remodeling. Two kinds found according to decrease or increase of collagen: atrophic plus hypertrophic. Atrophic one occurs due to decrease of collagen post inflammatory acne [5]. There are three types-ice pick, rolling and boxcar. Scarring occur after acne is considered worrying difficulty. Severe scarring is associated with psychological distress, particularly in young adults, and often results in decreased self-confidence and diminished quality of life. Treatment of acne scarring is a common indication for ablative lasers, more improvement is seen after CO_2 laser than other techniques. The fractional devices, both ablative and non-ablative, have been used for traditionally [6]. The present study was conducted to compare fractional carbon dioxide (CO_2) laser technique (FCLT) and derma roller therapy (DT) in patients with post-acne scars.

We found that group I had 19 males and 20 females and group II had 16 males and 23 females. Carbon dioxide (CO_2) laser resurfacing vaporizes tissue at a depth of 20 to 60um and zones of thermal necrosis ranging another 20 to 50um [7]. Energy at 10.600nm wavelength is absorbed by both intracellular and extracellular water, causing rapid heating and vaporization of tissue. Dermal heating below the zone of ablation induces a wound-healing response, which causes collagen remodeling and heat-mediated tissue contraction [8]. Re-epithelialization generally takes 5 to 10 days, and erythema may persist for months. Side effects may include dyschromia (hyper- or hypopigmentation), infection, lines of demarcation between treated and untreated areas, and scarring [9].

We observed that response of treatment was satisfactory seen in 9 in group I and 4 in group II, good in 10 in group I and 6 in group II, very good in 14 in group I and 13 in group II and excellent in 6 group I and 16 in group II. Stem *et al.* [10] determined the prevalence of acne and calculated the prevalence of various disease states based on NHANES primary data and the NHANES population weights. Prevalence estimates and male/female ratios of these estimates were calculated. From 1971 to 1974, the projected prevalence of ache conglobata (grade IV acne) for women and men 15 to 44 years of age in the United States was 250,000 and 570,000, respectively. At the time of examination, an additional 582,000 women and 749,000 men were projected to have moderate acne with cysts and scars. Therefore, the prevalence of ache conglobata and ache of at least a moderate degree with cysts and scars was 832,000 for women

and 1,319,000 for men 15 to 44 years of age. The male/female ratio for acne with cysts and scars is approximately 1.6:1.

We observed that mean objective score at baseline in group I was 31.4 and at follow up was 16.1 and in group II at baseline was 27.2 and at follow up was 15.1. Adityan *et al*. [11] determined the profile of acne vulgaris, its seasonal variation, relationship with smoking and possible correlation between acne vulgaris and markers of androgenicity in females. The parameters evaluated included age, gender, age of onset, duration of lesions, site of lesions, grade, relation with menstrual cycle, markers of androgenicity, number of acne lesions such as comedones, papules pustules and nodules, number and site of post-acne scarring, post-acne hyperpigmentation, seasonal variation and history of smoking. A total of 309 patients with acne vulgaris were included in the study. The frequency of acne vulgaris in our study was 1.068%. Mean age of the study group was 19.78 years. Male to female ratio was 1.25:1. The most common age group involved was 16 to 20 years (59.8%). Mean age of onset was 15.97 years. Face was involved in all the patients, followed by back (28.2%), chest (20.1%), neck (9.4%) and arms (10%). In the older age groups, women were more likely to report having acne vulgaris than men (P = 0.01). The closed comedones outnumbered open comedones by a factor of 4.9:1. A total of 186 patients (60.2%) had grade 1 acne vulgaris, 85 (27.5%) had grade 2 acne, 8 (2.6%) had grade 3 acne and 30 (9.7%) had grade 4 acne vulgaris. There was a higher incidence of scarring (39.5%) and post-acne hyperpigmentation (24.6%) in our study. In female patients, 57.7% had premenstrual flare and 12.4% had cutaneous markers of androgenicity. There was no association between severity of acne vulgaris and other markers of androgenicity (P = 0.108). Seborrheic dermatitis (21.35%) was the most common disease associated. Seasonal variation was observed only in 80 patients (25.9%); 71 patients (23%) exacerbated in summer and 9 patients (2.9%) in winter. Smokers had more severe grade of acne vulgaris compared to non-smokers.

Conclusion

Authors found that both Carbon dioxide laser and dermaroller technique found to be equally effective in patients with post acne scars.

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