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Original Research Article

A comparative study of radiofrequency micro-needling with platelet rich plasma and fractional LASER in acne scar management

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ABSTRACT

Background: Acne scars (AS) results in permanent scarring causes facial disfigurement to the patients. The aim of the study was to assess the comparative effectiveness and outcomes of radiofrequency micro needling and fractional carbon dioxide laser methods intreating acne scars.
Methods: This comparative observational study was conducted in the Ibn Sina diagnostic and consultancy center, Dhaka, Bangladesh during the period from January 2019 to December 2020. In total 30 patients with acne scar were selected as the study population. Among total participants, 15 patients who underwent radiofrequency micro needling treatment method were denoted as group-1 and the rest 15 patients who underwent carbon dioxide laser treatment method were denoted as group-2 patients. All data were processed, analyzed and disseminated by Microsoft (MS) office and statistical package for the social sciences (SPSS) version 26.
Results: In this study, in group A as per Goodman and Baron scale at the baseline 40% had grade-3 and 60% had grade-4 status. In the same group, after treatment 23.33, 30.00%, 20.00% and 13.33% patients improved up to grade 1, grade 2, grade 3 and grade 4 status respectively. On the other hand, in group-2, after treatment 26.67%, 50.00%, 20.00% and 13.33% patients improved up to grade 1, grade 2, grade 3 and grade 4 status respectively. Finally, according to the mean Goodman and Baron scale scores in both the groups, we found extremely significant correlations between both the baselineand after treatment status where <0001.
Conclusions: Both radiofrequency micro needling and fractional CO_2 laser treatment methods are effective for thetreatment of acne scars.

Keywords: Radiofrequency micro needling, Fractional LASER, Acne scar, Acne vulgaris

INTRODUCTION

AS results in permanent scarring causes facial disfigurement to the patients. Acne vulgaris (AV) is one of the most common skin diseases. It affects more than 85% of adolescents and adults where scarring is commonest sequelae.[1] Severe acne can cause permanent scarring as well as facial disfigurement can result in significant physical and even psychosocial distress especially in adolescents.[2] Basically, AS are a very distressing thing for the patients and a very difficult task for dermatologists to treat. Recently development of radiofrequency micro-needling and fractional carbon dioxide laser has been acknowledged by a lot of dermatologists to be quite effective in treating acne scars. Management of AS poses a therapeutic challenge for the dermatologists and surgeons. Several therapeutic measures like dermabrasion, chemical peeling, subcision, fillers as well as punch techniques have been applied with limited efficacy.[3]

Ablative lasers like erbium, carbon dioxide, yttrium aluminum garnet (YAG) lasers based on the principle of selective photothermolysis, can effectively improve atrophic acne scarring, but have been hindered in its continuous use due to extended post-procedure recovery period and associated morbidity like post inflammatory hyperpigmentation, erythema, hypopigmentation and scarring.[4] So, there is a necessity of newer therapeutic modalities which will be safer, efficacious and with minimal downtime for treating acne scars. The ablative fractional resurfacing makes a microscopic treatment zone to stimulate the wound healing responses. By this method, the tissue surrounding columns are spared, ultimately resulting in rapid epidermal regeneration with reduced downtime and ensures less adverse reactions than that of traditional ablative lasers.[5] Such newly introduced method of ablative conventional carbon di-oxide (CO_2) laser therapy with fractional CO_2 laser resurfacing was exposed to be safe and effective in treating acne scars.[6] On the other hand, a recently developed minimally invasive novel technique of treating AS is radiofrequency micro needling fractional. In this method, microneedles penetrate into the skin with minimal injury to the epidermis and once within the dermis, radiofrequency energy is delivered through the needles. The heat produced by the resistance offered to passage of radiofrequency energy by the skin results dermal remodelling, neocollagenogenesis and neoelastogenesis resulting in dermal thickening and skin rejuvenation.[7] Microneedling fractional radio frequency treatment has demonstrated the significant improvement of acne scars, skin rejuvenation and open pores.[8] The major objective of this study was to assess the comparative effectiveness and outcomes of radiofrequency micro-needling and fractional CO_2 laser methods in treating acne scars.

METHODS

This comparative observational study was conducted in the Ibn Sina diagnostic and consultancy center, Dhaka, Bangladesh during the period from January 2019 to December 2020. In total 60 patients with acne scar were selected as the study population. Among total participants, 30 patients who underwent radiofrequency micro-needling treatment method were denoted as group-1 and the rest 30 patients who underwent CO_2 laser treatment method were denoted as group-2 patients. Both groups were statistically harmonized regarding age, gender, severity of disease and Fitzpatrick skin type. According to the inclusion criteria of this study, AS patients aged >18 years were finalized as the study people. On the other hand, according to the exclusion criteria of this study, patients with presence of active acne lesions, receiving any previous treatment for acne scar within the last one month, cases having keloid scarring or keloid tendency. Patients with the history of bleeding disorder and anticoagulant therapy or oral steroid therapy, pregnant and lactating mothers and patients with active skin infection like herpes, warts and/or bacterial infection on the face were excluded from the study. For the patients who received fractional CO_2 laser, topical anesthetic cream was applied for 30-60 min before the laser session. Then the treatment area was cleaned with mild cleanser and dried with sterile gauze. The Flounce ranging were from 15 to 25 j/cm^2 at the thicknesses of 100 mtz/cm^2, thus providing about 15 to 25 mj of energy, pulse with 1500 to 2000 ns, repeat delay of 1000 µs and ablation deepness (1.0 to 1.2) mm for each spot. The patients were advised a skin cooling with ice-packs for 5 to 10 minutes after the procedure to take care of post-treatment edema, erythema, and burning sensation. The objective assessment of this study at baseline and follow-up of improvement were evaluated by digital photographing with identical camera settings, clinical examinations and qualitative acne scarring grading system according to the global acne scarring classification of Goodman and Baron.[9] The evaluation was performed as monthly follow-up after each one of the four sessions and two months later on after the 4th session as the final assessment and the final percentage of the improvement was assessed by the quartile grading scale at the six months period of the study.[10] All data were processed, analyzed and disseminated by MS office and SPSS version 26. Continuous variables were evaluated by using mean of them significant p value less than 0.05.

RESULTS

In this study, among total 30 participants, 43.33% were male and 56.66% were female. So, female participants were dominating in number and the male-female ratio was 1:1.3. The highest number of participants were from 18-30 years' age group which was 50.00%.

Table 1: Demographic and clinical status of total participants (n=30).

Characteristics	N	%
Gender distribution		
Male	13	43.33
Female	17	56.66
Age distribution in year		
18-30	15	50.00
31-40	10	33.33
>40	5	16.66
Suffering period (years)		
≤1	3	10.00
>1	27	90.00
Fitzpatrick skin type distribution		
Type II	5	16.66
Type III	14	46.66
Type IV	11	36.66
Goodman and Baron scale distribution		
Grade 3	14	46.66
Grade 4	16	53.33

Besides this, 33.33% were from 31-40 years' age group and the rest 16.66% were from >40 years' age group. The suffering period of the most of the participants (90%) was

>1 years. According to the Fitzpatrick skin type distribution we observed, 16.66% and 46.66% and 36.66% patients were with type II, type III and type IV status of disease respectively. On the other hand, according to the Goodman and Baron scale distribution, 46.66% patients were with grade-3 and 53.33% were with grade-4 status. In this study, in group A as per Goodman and Baron scale at the baseline 40% had garde-3 and 60% had grade-4 status. In the same group, after treatment 23.33, 30.00%, 20.00% and 13.33% patients improved up to grade 1, grade 2, grade 3 and grade 4 status respectively. On the other hand, in group-B, after treatment 26.67%, 50.00%, 20.00% and 13.33% patients improved up to grade 1, grade 2, grade 3 and grade 4 status respectively. Finally, according to the mean Goodman and Baron scale scores in both the groups, we found extremely significant correlations between both the baseline and after treatment status where <0001. On the other hand, in comparing the quartile classifying scale scores between both the groups we did not find any significant correlation between the groups where the p value was 0.787.

Table 2: Improvement status of participants as per Goodman and Baron scale (n=30).

Grading	Group A (n=15)				Group B (n=15)			
	Baseline		After treatment		Baseline		After treatment	
	N	%	N	%	N	%	N	%
Grade 1	0	0	7	23.33	0	0	8	26.67
Grade 2	0	0	9	30.00	0	0	15	50
Grade 3	6	40	3	20.20	8	53.33	3	20.00
Grade 4	9	60	2	13.33	7	46.66	2	13.33

Table 3: Final evaluation of results as per mean Goodman and Baron scale scores of participants (n=30).

Groups	Baseline	After treatment	P value
Group A	3.63±0.45	2.37±0.13	<0.0001
Group B	3.57±0.44	2.03±0.65	<0.0001

Table 4: Quartile classifying scale score distribution between the groups (N=30).

Quartile grading scale	Group A		Group B	
	N	%	N	%
Mild improvement (0-25%)	2	13.33	4	26.66
Moderate improvement (26-50%)	4	26.67	6	40.00
Good improvement (51-75%)	6	40.00	4	26.66
Excellent improvement (76-100%)	3	20.00	1	6.66
P value	0.787			

DISCUSSION

This study aimed to assess the comparative effectiveness and outcomes of radiofrequency micro-needling and fractional carbon dioxide laser methods in treating acne scars. AV is a very common skin disorder practiced by adults and adolescents. Moderate to severe acne vulgaris formation accompany by inflammation lead to losing of fat as well as dermal collagen and formation of atrophic scar.[11] In this current study, among total 30 participants, 43.33% were male and 56.66% were female. So, female participants were dominating in number and the male-female ratio was 1:1.3. The highest number of participants were from 18-30 years' age group which was 50.00%. Besides this, 33.33% were from 31-40 years' age group and the rest 16.66% were from >40 years' age group. Such age distribution was also approved by another study.[12] Another study also showed that, the atrophic component of the scar was emphasized by premature facial capacity changes and understated laxity of skin after age 30/40 years.[11] Basically, AS is difficult to treat in all types of skin. In darker skin, people were a greater challenge as a result of hyperpigmentation after inflammation and high danger of scarring.[13] In our study, according to the Fitzpatrick skin type distribution we observed, 16.66% and 46.66% and 36.66% patients were with type II, type III and type IV status of disease respectively. On the other hand, according to the Goodman and Baron scale distribution, 46.66% patients were with grade-3 and 53.33% were with grade-4 status. In this study, in group A as per Goodman and Baron scale at the baseline 36.67% had grade-3 and 63.33% had grade-4 status. In the same group, after treatment 23.33, 30.00%, 20.00% and 13.33% patients improved up to grade 1, grade 2, grade 3 and grade 4 status respectively. Many comparative studies of safety and efficacy of fractional CO_2 laser with other treatment modalities in the treatment of post acne scars have been conducted in the past few years.[10] On the other hand, in group-B, after treatment 26.67%, 50.00%, 20% and 13.33% patients improved up to grade 1, grade 2, grade 3 and grade 4 status respectively. Finally, according to the mean Goodman and Baron scale scores in both the groups,

we found extremely significant correlations between both the baseline and after treatment status where <0001. On the other hand, in comparing the quartile classifying scale scores between both the groups we did not find any significant correlation between the groups where the p value was 0.787. These results were approved by another study about the efficacy of fractional CO_2 laser in management of scars after acne, fractional CO_2 laser may actively correct atrophic scarring, which is a common sequel from loss of collagen and elastic fibers after inflammatory processes.[10] Fractional laser therapy falls somewhere in between no ablative and ablative approaches. It is capable of producing 26-50% improvement without side effects.[14] Likewise, enforcement came from Saeed et al 2018, signifying that, good or excellent response mean positive (75%) of group inside study, so that fractional CO_2 laser used for management of atrophic acne scars resurfacing as monotherapy seems to be effective, and without significant side effects, even in darker-skinned patients.[15] All the findings may be helpful in similar further studies.

Limitations

This was a single centered study with a small sized sample. So, findings of this study may not reflect the exact scenario of the whole country.

CONCLUSION

In this study, we observed, significant reduced acne scar scores by both radiofrequency micro needling and fractional CO_2 laser reappearing methods. We did not find any significant difference between the final outcomes of both group patients. Both radiofrequency micro needling and fractional CO_2 laser treatment methods are effective for the treatment of acne scars. For getting more specific information regarding this issue we would like to recommend for conducting more studies in several places with larger sized samples.

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Ethical approval: The study was approved by the institutional ethics committee

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