



## A Comparative Study of Microneedling radiofrequency and Fractional co2 laser in the treatment of atrophic acne scars

R.G.Sharada<sup>1</sup>, Babbita Sandi<sup>2\*</sup>, C.R.V.Narasimhalu<sup>3</sup>

<sup>1,2,3</sup>Department of Dermatology, Venereology and Leprosy, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai

\*Corresponding author: Babbita Sandi, Department of Dermatology, Venereology and Leprosy, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai

Submitted: 21 February 2023; Accepted: 11 March 2023; Published: 07 April 2023

### ABSTRACT

**Objective:** To compare the efficacy of MNRF and Fractional CO<sub>2</sub> laser in patients with atrophic acne scars.

**Materials and methods:** This study is prospective randomized, comparative study done after obtaining the patient's consent. 40 patients with atrophic acne scars in the age group 18 years to 35 years were included in our study. They are divided into Group A and Group B with 20 patients each. MNRF was done for Group A and Fractional CO<sub>2</sub> laser was done for group B. Both groups were treated for 4 sessions at 4 weekly intervals.

**Results:** In our study, the maximum number of patients were under the age group of 22-25 years. Males (72.5%) were more commonly affected than females (27.5%). 45% had scars for a period of 1-3 years. The most common type of acne scar is the mixed/combined type (50%). Majority of the patients in MNRF had Grade 3 acne scars (40%) and fractional co<sub>2</sub> had Grade 2 acne scars (60%). The common complications observed in our study was erythema (45%).

**Conclusion:** Micro-Needling Radiofrequency was found to be safest and more effective modality when compared with fractional co<sub>2</sub> laser for the treatment of atrophic acne scar.

**Keywords:** *Acne vulgaris, Acne scars, Fractional CO<sub>2</sub>, Microneedling Radiofrequency*

### INTRODUCTION

Acne vulgaris is a common inflammatory phenomenon affecting the pilosebaceous unit. It presents clinically as open or closed comedones, papules, pustules or nodules and associated with varied degree of scarring. Acne and post acne scarring leads to psychological distress causing anxiety, depression, lack of self-confidence<sup>[1][2]</sup>.

Acne scars are of two types [Atrophic and hypertrophic] based on the response to tissue injury. Atrophic scars are more common than hypertrophic scars. Atrophic scars result from

inadequate collagen production and hypertrophic scars as a result of excessive collagen synthesis. Post acne scarring with contour defects respond better to resurfacing procedures such as dermabrasion, subcision, chemical peeling, erbium laser resurfacing, punch grafting and injectable fillers<sup>[3]</sup>. Newer technologies like micro needling radiofrequency, fractional CO<sub>2</sub> laser are superior to conventional modalities in providing better efficacy, quicker action, improved safety and non-systemic administration.

Micro needling Radiofrequency works on the principle of neo-collagenesis by using insulated micro needles stimulating the release of growth factors and promotes collagen remodelling without damaging the epidermis. It is often used as a substitute for laser treatments in darker skin phototypes due to the absence of post-inflammatory hyperpigmentation [4].

The term "fractional" refers to the fact that only a fraction of the skin is treated by creating columns of heat while leaving the surrounding dermal tissue unaffected [5]. Fractional CO2 laser works on fractional photo- thermolysis which tends to emit laser beam in a pixilated manner creating arrays of microscopic thermal zones (MTZ) at specific depth in the skin without damaging the surrounding tissue promoting collagen re-modelling and evens out pitted acne scars. The variables like power, treatment area, number of passes, shape must be modified based on skin type, treatment area and desired downtime.

This study is done to evaluate which is more effective for the management of atrophic acne scars.

### MATERIALS AND METHODS

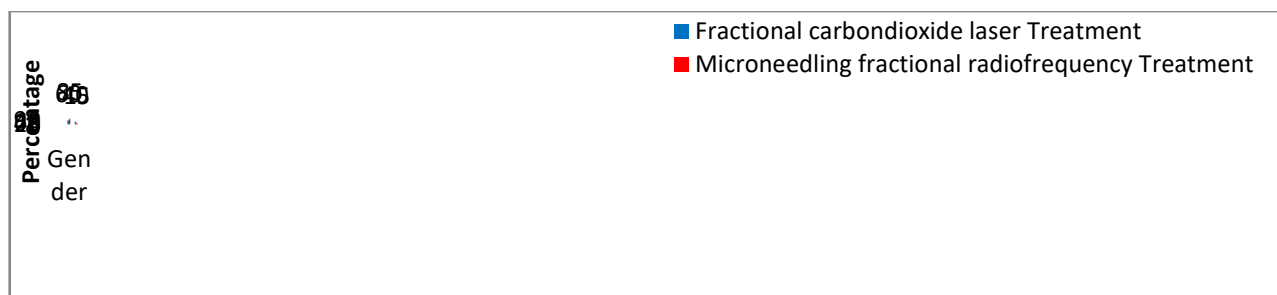
This study is prospective randomized, comparative study done in the Department of Dermatology, Saveetha Medical College from March 2020 to August 2021 after obtaining patients consent and ethical committee clearance. The data was analysed using SPSS version 19.0 using N master software. A total of 40 people participated in our study and they were allocated into two groups A and B. Group A (20) were treated with Micro-needling Radiofrequency and Group B (20) patients were treated with Fractional CO2 laser for 4 sessions at 4 weekly interval. Patients who were using any other topical treatment for acne scars were told to stop at least 2 - 4 weeks before the start of treatment. No concomitant cosmetic procedures were allowed between the sessions.

**TABLE 1:** Distribution of Age between study population

Age wise	Treatment		
	Group- A N (%)	Group- B N (%)	Total N (%)
18 - 21	3 (15)	5 (25)	08 (20)
22 -25	9 (45)	9 (45)	18 (45)
26 - 29	8 (40)	3 (15)	11(27.5)
30 - 32	0 (0)	3 (15)	03 (7.5)
Total	20 (100)	20 (100)	40 (100)

Fisher Exact test: Value = 5.320, p =.131 (ns)

### Gender distribution



**GRAPH 1:** Distribution of Gender between study subjects

**Distribution based on duration of scar**

**TABLE 2:** Distribution of Duration of Scar among study population by using Chi-square test

Duration of Scar	Treatment		
	Group- A N (%)	Group- B N (%)	Total N (%)
1-3 Years	07 (35)	11(55)	18 (45)
4 -5 Years	08 (40)	05 (25)	13(32.5)
> 5 Years	05 (25)	04 (20)	09(22.5)
Total	20 (100)	20 (100)	40 (100)

Fisher Exact test: Value = 1.703, p =.439 (ns)

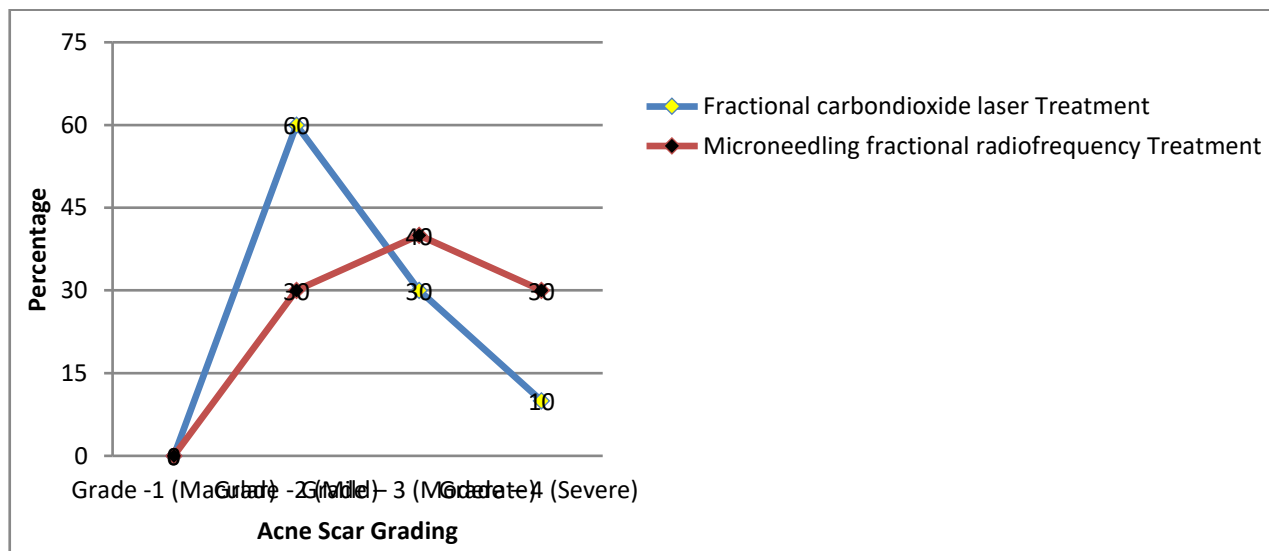
**Distribution based on type of scars among study population**

**TABLE 3:** Distribution of Combined scar among study population by using Chi-square test

Combined Scar Type	Treatment		
	Group- A N (%)	Group- B N (%)	Total N (%)
Box Alone	02 (10)	07(35)	09 (22.5)
Rolling Alone	02 (10)	01 (05)	03 (07.5)
Box & Rolling	10 (50)	10 (50)	20 (50)
Box & Ice Pick	02 (10)	0	02 (05)
Box, Rolling & Ice pick	04 (20)	02 (10)	06 (15)
Total	20 (100)	20 (100)	40 (100)

Fisher Exact test: Value = 3.589, p =.293 (ns)

**Grading of acne scar among study population**



**GRAPH 2:** Inter group comparison of Grade 1- 4 (Macular – Severe) scar among study subjects

**Acne scar Improvement Score in study population**

Acne scar improvement score is the scoring system used to assess improvement in the appearance of scars. This scoring system is a 6-point scoring system based on the percentage of improvement. Score 0 is no improvement (< 10% improvement) whereas as score 6 is excellent

improvement (>90% improvement). The most improvement in Group-B is seen in the moderate range with a p value of 0.047, which is significant whereas, Group-A showed improvement in the very good range with a p value 0.008. There is an overall trend of increasing improvement with Group-A than Group-B.

**TABLE 4:** Comparison of quantitative variable

Parameter	Treatment		T value	P value
	FCo2 Laser Mean ± SD	MNRF Mean ± SD		
Age	24.20 ± 4.04	24.40 ± 3.01	-.177	.860
Duration of Scar	3.40 ± 1.78	4.25 ± 2.02	-1.0408	.167

In our study, age and duration of acne scar was calculated using independent t test. The mean age in MNRF group was 24.40 ± 3.01 and 24.20 ± 4.04 in fractional co2 group. The mean duration of scar was found to be 4.25 ± 2.02 in MNRF and 3.40 ± 1.78 in fractional co2 group.

**DISCUSSION**

Acne vulgaris is a common skin disorder that affects people world over. It is known that people with inflammatory acne lesions tend to develop scarring more frequently. Laser resurfacing by ablative techniques using Erbium doped Yttrium Aluminium Garnet laser is the conventional treatment for acne scar but it carries the drawbacks of long recovery period, dyspigmentation, infection, and prolonged erythema. There is thus, a need for newer therapeutic modalities that are more efficacious, safe with minimal downtime. Here, we have studied and compared the effectiveness of Micro-Needling Radiofrequency and Fractional CO2 Laser.

In our study, the maximum number of patients were under the age group of 22-25 years [TABLE 1]. The minimum age was 18 years and maximum age was 32 years. The mean age of the population is 24.40 ± 3.01 in MNRF and 24.20 ± 4.04 for Fractional Co2 in our study. The mean age of patients with acne scars in the study conducted by Reddy et al was 25.86 years for MNRF and 27.40 years for Fractional Co2 which

was similar to our study: Males (72.5%) were more commonly affected than females (27.5%)

[GRAPH 1]. This could be attributed to the fact that females seek early treatment for active acne which may limit the incidence of scarring. In a study conducted by Rajput et al, females were

more common than males Majority of our patients (45%) in our study had scars for a period of 1-3 years [TABLE 2]. The mean duration of age of scars was 4.25 ± 2.02 in MNRF and 3.40 ± 1.78 in fractional co2 laser. In the study done by Majid et all, the mean duration of the age of scars was between 5 and 10 years [8].The same was also the duration in a study done by Reddy et al.

The most common type of acne scar in our study is the mixed/combined type, with a mix of box and rolling type (50%) [TABLE 3]. This pattern was shown by 20 out of the 40 patients we studied. In a study done by Layton et al , the patients showed a predominance of ice pick scars.

Grading of acne scars prior to procedure was done using Goodman and Baron qualitative scar grading system. In our study, majority of the patients in MNRF had Grade 3 acne scars (40%) and fractional co2 had Grade 2 acne scars (60%) [GRAPH 2]. Improvement after four sessions was assessed with the help of acne scar improvement score. MNRF group showed very good improvement with a significant p value 0.008. The most improvement in fractional CO2 is seen in the moderate range with a p value of 0.047, which is significant. In a study conducted by Petrov et all, 2 out of 40 showed minimum improvement whereas 6 out of 40 showed

moderate improvement with fractional CO<sub>2</sub> laser. In Chandrasekhar Et al study, only 9% of the patients showed good improvement with MNRF.

The common complications observed in our study are erythema, oedema, pain and post inflammatory hyperpigmentation (PIH). Erythema was more common in Group A affecting 9 out of 20 patients (45%). According to Reddy et al, almost all patients experienced transient oedema and erythema.(100) The most striking observation was that in our study, no patient developed PIH post MNRF (P=0.035, P<0.05), this is a significant difference. This is consistent with findings in the study conducted by Reddy et al, wherein no patients developed PIH in their MNRF group.

On comparison, MNRF showed improvement in the very good range whereas Fractional CO<sub>2</sub> laser showed improvement in moderate range. MNRF was statistically found to be associated with very good improvement scores and better outcome [TABLE 4]. There is no risk of PIH with MNRF whereas 4 patients developed PIH in fractional CO<sub>2</sub> group. MNRF group was associated with risk of transient erythema which disappeared in few hours.

### CONCLUSION

Various modalities of treatment are available for the treatment of atrophic acne scars. These include subcision, chemical peels, ablative lasers, dermal grafting, punch excision, punch elevation, punch grafting and fillers. All the procedures have their own advantages and disadvantages. Newer treatment options like fractional CO<sub>2</sub> laser and Micro needling Radiofrequency have been efficiently used in the management of acne scars. On comparison, Micro-Needling Radiofrequency was found to be safest and more effective modality when compared with

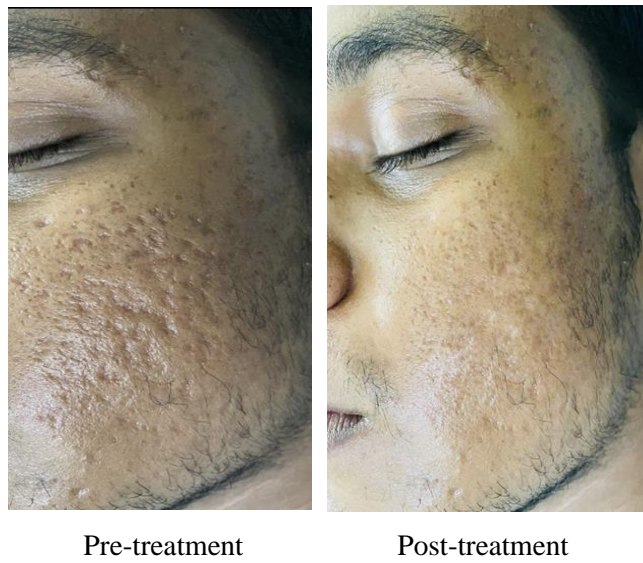
fractional CO<sub>2</sub> laser in the treatment of atrophic acne scar.

### REFERENCES

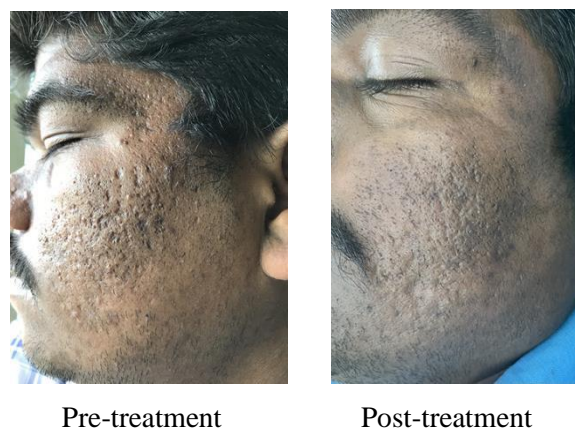
1. Dréno B, Tan J, Kang S, Rueda M-J, Torres Lozada V, Bettoli V, et al. How People with Facial Acne Scars are Perceived in Society: an Online Survey. *Dermatol Ther (Heidelb)*. 2016 Apr 18;6(2):207–18.
2. Hazarika N, Archana M. The Psychosocial Impact of Acne Vulgaris. *Indian J Dermatol*. 2016;61(5):515–20.
3. Goodman GJ. Management of Post-Acne Scarring: What are the Options for Treatment? *American Journal of Clinical Dermatology*. 2000 Jan;1(1):3–17.
4. Juhasz ML, Cohen JL. Microneedling for the Treatment of Scars: An Update for Clinicians. *CCID*. 2020 Dec;Volume 13:997–1003.
5. Ramsdell W. Fractional Carbon Dioxide Laser Resurfacing. *Seminars in Plastic Surgery*. 2012 Nov 1;26(03):125–30.
6. Reddy K, Swaroop R, Mallaya R, Ghosh A, Krishn Z. A comparative study of efficacy of fractional carbondioxide laser and microneedling fractional radiofrequency in the treatment of acne scars. *IP Indian Journal of Clinical and Experimental Dermatology*. 2021 Feb 28;7:47–53.
7. Rajput CD, Gore SB, Ansari MK, Shah SM. A Prospective, Nonrandomized, Open-label Study, Comparing the Efficacy, Safety, and Tolerability of Fractional CO<sub>2</sub> Laser versus Fractional Microneedling Radio Frequency in Acne Scars. *J Cutan Aesthet Surg*. 2021 Jun;14(2):177–83.
8. Majid I, Imran S. Fractional CO<sub>2</sub> Laser Resurfacing as Monotherapy in the Treatment of Atrophic Facial Acne Scars. *J Cutan Aesthet Surg*. 2014;7(2):87–92.
9. Layton AM, Henderson CA, Cunliffe WJ. A clinical evaluation of acne scarring and its incidence. *Clin Exp Dermatol*. 1994 Jul;19(4):303–8.



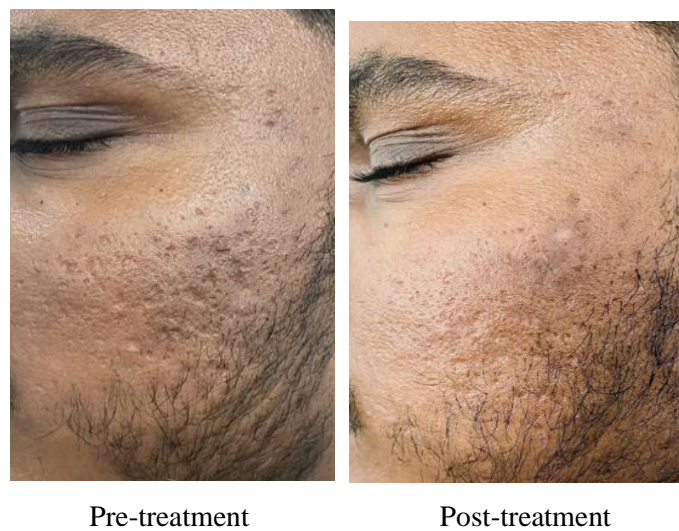
*Legends Of Illustration*

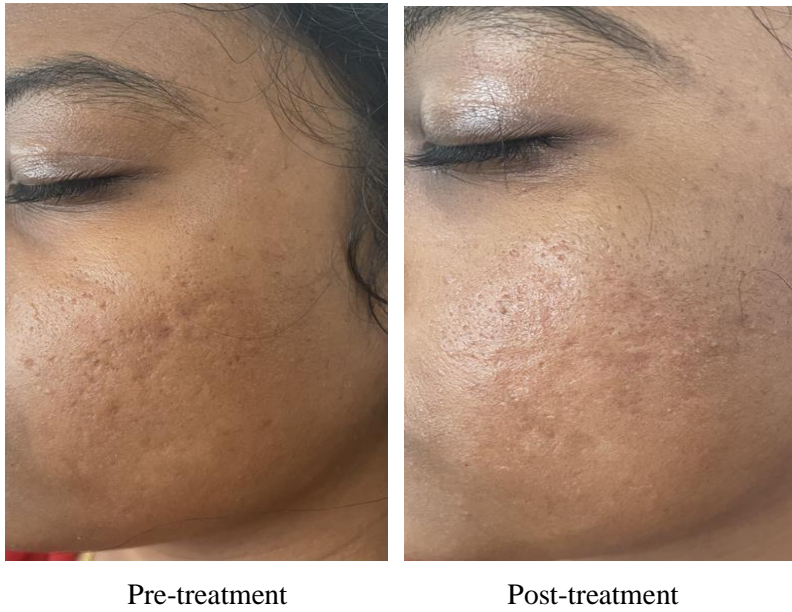


**FIGURE 1:** Treatment Response In Group A-Mnrf



**FIGURE 2:** Treatment Response In Group B-Fractional Co2 Laser





**FIGURE 3:** Complications Post Fractional Co2

Immediate erythema and oedema after fractional co2 laser



PIH after fractional co2 after 2 weeks

