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Original Research Article

Comparison of efficacy of micro-needling plus platelet-rich plasma and fractional CO2 laser plus platelet-rich plasma in the treatment of post-acne scars

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Abstract: ***Background:*** A post-acne scar on the face is one of the most significant therapeutic problems that can impact patient's quality of life. Therefore proper management is crucial. ***Objective:*** The objective of this study was to compare the efficacy of micro-needling plus platelet-rich plasma and fractional CO2 laser plus platelet-rich plasma in the treatment of post-acne scars. ***Material and method***: The current randomized control trail study was done at the department of Dermatology Northwest School of Medicine and General Hospital Peshawar from March 2025 to August 2025 after taking permission from the ethical board of the institute. Individuals of both genders and different age groups with different kinds of post-acne scars except hypertrophic scars were enrolled. The sample size was determined through WHO calculator. The sample size determined was 76. The study participants were divided randomly in to group (A) and group (B) (38 each) on the basis of treatment procedure. Group (A) received PRP plus micro needling while group (B) was subjected to PRP plus fractional CO2 laser. For data analysis SPSS version 24 was applied. ***Results:*** A total of 76 individuals were enrolled in this study. In group (A) Female were 47.3% while male were 52.6%. In group B females were 52.6% and male were 47.3%. In group A, 2 patients (5.2%) experienced excellent improvement, whereas 32 patients (84.2%) showed good improvement. In group B two patients (5.2%) asserted excellent improvement, while 21 (55.2%) reported good improvement ($p<0.005$). Among patients with rolling scars, 83.3% in group A reported good improvement, versus 100% in group B. Two patients (16.6%) in group A showed excellent improvement. However, no participant showed excellent improvement in group B (p-value =0.56). Among individuals who had box scars, 100% reported good improvement compared to 84.6% in group B. 2 (15.3%) participants in group B reported excellent improvement, while no individuals in group A reported excellent improvement (p-value =0.44). Among participants who had Ice pick scars, 8 (72.7%) in group A had a good improvement compared to 2 (12.5%) in group B. The fractional CO2 laser group showed a substantial improvement (p value < 0.001). ***Conclusion:*** The present study concluded that in the treatment of post-acne scar, micro-needling plus PRP is a better treatment choice in comparison to fractional CO2 plus PRP.

Keywords: Acne post scars, fractional CO2, PRP micro-needling

INTRODUCTION

Acne is a prevalent problem seen by dermatologists. Acne scarring is mostly caused by the disease's severity, natural development, and individual susceptibility.[1-2] Acne scars on the face is one of the most significant therapeutic problems can pointedly impact a patient's quality of life. Approximately 95% of acne patients experience facial scarring, which can have a psychological impact on the sufferer. [3] Techniques for treating this condition include

dermabrasion, microdermabrasion, chemical peeling, & laser therapy.[4] Platelet-rich plasma (PRP) is a modest amount of autologous plasma platelet concentration that has been utilized and studied since the 1970s.[5] It stimulates collagen formation in the skin.[6] PRP injections promote regeneration and better skin, which makes them an effective therapy for cutaneous injuries such as acne scars. PRP is plasma from blood with up to seven times the increased platelet content. PRP can repair chronic skin ulcers, rejuvenate skin, treat alopecia, and reduce post-acne scars. [7] The fractional carbon dioxide (CO2) laser creates small thermal channels in the skin, resulting in smoother skin and reduced scar severity through collagen regeneration.[8] Fractional CO2 laser treatment can effectively treat acne scars, but its drawbacks, such as prolonged skin inflammation and swelling, may cause patient dissatisfaction and disrupt their daily lives, limiting its use.[9] A recent study found risks related with fractional CO2 lasers. These concerns vary in severity & can persist, particularly in skin types IV & VI.[10] New procedures have led to good outcomes and increased patient satisfaction. Treatment options for atrophic acne scars include microneedling, subcision, laser resurfacing, punch excision, microdermabrasion, chemical peeling, dermal fillers & grafts, trichloroacetic acid, and platelet-rich plasma (PRP). Micro-needling, also known as collagen induction therapy, is a minimally invasive treatment that uses small needles to puncture the skin and release growth factors that enhance wound healing.[11] Micro-needling combined with PRP and topical antioxidants is an effective treatment option for dermatological conditions.[12] The present study was carried out to compare the efficacy of micro-needling plus platelet-rich plasma and fractional CO2 laser plus platelet-rich plasma in the treatment of post-acne scars.

Material and method

The current randomized control trail study was done at the department of Dermatology Northwest School of Medicine and General Hospital Peshawar from March 2025 to August 2025 after taking permission from the ethical board of the institute. Individuals of both genders and different age groups(ranged 15-45 years) with different kinds of post-acne scars except hypertrophic scars were enrolled while individuals with any active skin diseases (facial warts), active acne, any bleeding disorder and lactating and pregnant women were excluded from this study. The sample size was determined through WHO calculator. The sample size determined was 76. The study participants were divided randomly in to group (A) and group (B) (38 each) on the basis of treatment procedure. Group (A) received PRP plus micro needling while group (B) was subjected to PRP plus fractional CO2 laser. Written consent were taken from each participant and demographic features were recorded of each individual. Photos were taken of every individual prior to and following the procedure. After sterilization, patients were given a dense coating of local anesthetic on their faces. Then, 10 ml of whole blood was taken into tubes which contained acid citrate dextrose and spun at 1500 rpm for ten minutes to obtain platelet-rich plasma at the top. The PRP solution was centrifuged at 4000 revolutions per minute for 10 minutes to produce the final solution. The technique was repeated monthly for an overall duration of three sessions. Pre and post-procedure photos were captured. For data analysis SPSS version 24 was applied. For numerical variables, mean and standard deviation were determined; for categorical variables, percentages and frequencies were computed. The p value < 0.05 was considered statistically significant.

RESULTS

A total of 76 individuals were enrolled in this study. The study participants were divided randomly in to group (A) and group (B) (38 each) on the basis of treatment procedure. Group (A) received PRP plus micro needling while group (B) was subjected to PRP plus fractional CO2 laser. In group A Female were 18(47.3%) while male were 20(52.6%). In group B females were 20(52.6%) and male were 18(47.3%) as presented in table 1. The majority of patients in both groups (65.7% in group A and 71.0% in group B) were under 30 years old as presented in **table 2.** The globally acne scarring grading system classified effectiveness as excellent (improvement of >90%), good (improvement of 50% to 90% in post-acne scars), and poor (improvement of <50%). In group A, 2 patients (5.2%) experienced excellent improvement, whereas 32 patients (84.2%) showed good improvement. In group B two patients (5.2%) asserted excellent improvement, while 21 (55.2%) reported good improvement. The Chi-square test revealed a significant difference in efficacies ($p<0.005$) as shown in **table 3**. Among patients with these rolling scars, 10 (83.3%) in group A reported good improvement, versus 9 (100%) in group B. Two patients (16.6%) in group A showed excellent improvement. However, no participant showed excellent improvement in group B. There was no significant difference in effectiveness between age groups (p-value = 0.56). Among individuals who had box scars, 15 (100%) reported good improvement compared to 11 (84.6%) in group B. Two (15.3%) participants in group B reported excellent improvement, while no individuals in group A reported excellent improvement. The difference in effectiveness was not statistically significant (p-value =0.44). Among participants who had Ice pick scars, 8 (72.7%) in group A had a good improvement compared to 2 (12.5%) in group B. The fractional CO2 laser group showed a substantial improvement (p value < 0.001) as presented in **table 3.**

Table 1. Gender wise distribution of the Study population N=76

Gender	Procedure of treatment		Value of P
	Group A (38)	Group B (38)	
Female	18(47.3%)	20(52.6%)	0.62
Male	20(52.6%)	18(47.3%)	
Total	38	38	

Table 2.Main features of the study participants

Mean Age of the participants	Mean No of scares	Mean duration of scars
27.58 years	25.20	14.32 months
Age in SD 5.19 years	No of scares in SD 7.10	duration of scars in SD 3.66 months

Table 3. Efficacy of both procedures N=76

Efficacy of therapy	**Procedure of treatment**		
	Group A (38)	**Group B (38)**	**P value**
Poor response	**4(10.5%)**	**15(39.4%)**	**P-Value**
Excellent improvement	**2(5.2%)**	**2(5.2%)**	**0.005**
Good improvement	**32(84.2%)**	**21(55.2%)**	
Total	**38**	**38**	

Table 4.Efficacy stratification by post-acne scar type **N=76**

Types of Scars/ Efficacy	Procedure of treatment		Value of P
	Group A (38)	Group B (38)	
Rolling scares			
Excellent	2(16.6%)	0(0%)	0.56
Good	10(83.3%)	9(100%)	
Poor	0(0%)	0(0%)	
Total	12(100%)	9(100%)	
Box scars			
Excellent	0(0%)	2(15.3%)	0.44
Good	15(100%)	11(84.6%)	
Poor	0(0%)	0(0%)	
Total	15(100%)	13(100%)	
Ice pick scars			
Good	8(72.7%)	2(12.5%)	0.001
Poor	3(27.2%)	14(87.5%)	
Total	11(100%)	16(100%)	

DISCUSSION

Acne vulgaris affects 9.4% of the world's population, primarily adolescents. It affects 90% men and 80% girls across all ethnic groups. Delaying therapy can lead to scars and psychological issues, as evidenced by data.13-14 Acne scarring is a common consequence for up to 95% of acne vulgaris patients.15 Acne scars are classified into four categories based on shape and depth: icepick / V shaped, boxcar / U shaped, rolling / M shaped, & hypertrophic.16 Scar-reduction treatments include retinoids, dermabrasion, micro-needling, botulinum toxin injections, dermal fillers, and lasers.17 Most techniques do not entirely erase acne scars. There is an increasing interest in integrating these treatments to treat post-acne scars. Platelet-rich plasma (PRP) can enhance the look of atrophic post-acne scars treated with micro needling or ablative fragmented lasers.18 Adding PRP to micro needling and fractional CO2 laser treatments enhances scar quality and reduces laser-related adverse effects such as erythema and edema. Local treatments for post-acne scars include fractional CO2 lasers and micro needling. However, the combination of PRP was not examined in this perspective. This comparative research compared the effectiveness of several treatments for treating post-acne scars. A total of 76 individuals were enrolled in this study. The study participants were divided randomly in to group

(A) and group (B) (38 each) on the basis of treatment procedure. Group (A) received PRP plus micro needling while group (B) was subjected to PRP plus fractional CO2 laser. In group A Female were 47.3% while male were 52.6%. In group B females were 52.6% and male were 47.3%. Similar pattern of demographic features were observed in the study conducted by Rahman et al.19 In our study most of the participants in both groups were under the age of 30 years .these finding are similar to the study of Solanki et al.20 Our study found that micro-needling with PRP was more successful than fractional CO2 ($p<0.005$). El Refaei AM et al. found that combination treatment considerably improved clinical outcomes compared to laser alone. The study found that micro-needling plus PRP were more successful than fractional CO2 in treating post-acne scars, supporting our findings.21 In a comprehensive analysis, Chang HC et al. found that combining micro-needling with PRP was more effective than either PRP or micro-needling alone ($P<0.001$), which is consistent with our findings.22 Alser OH et al. found that combining PRP with microneedling produced better outcomes for treating post-acne scars (60% vs 46.7%, $P=0.89$), which aligns with the findings of this study.23 In a split-face regimen-based trial, Solanki AD et al. found that microneedling plus PRP & fractional CO2 laser plus PRP were successful in treating post-acne scars and received positive patient feedback.20 El Refaei AM et al. reported excellent results in 16% of box scar patients, while our study found excellent results in 15.3% and good results in 84.6% of box scar cases treated with fractional CO2 plus PRP.21 Overall, they identified that micro-needling with PRP produced better outcomes than fractional CO2 with PRP, which is consistent with our findings. This study compares the effectiveness of micro needling with PRP to fractional CO2 with PRP. The results show that micro-needling with PRP is a more effective treatment option for post-acne scars in local populations. The considerable difference in efficacy ($p<0.005$) suggests that micro-needling combined with PRP is a viable therapeutic option for this condition. This study demonstrates that micro-needling with PRP requires less equipment than fractional CO2, making it more accessible for practitioners.

Conclusion

The present study concluded that in the treatment of post-acne scar, micro-needling plus PRP is a better treatment choice in comparison to fractional CO2 plus PRP. Treatment with each of these techniques requires multiple sessions to achieve substantial results.

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