Original Article

Efficacy and Safety of Combining Micro-Needling with Platelet-Rich Plasma (PRP) for the Treatment of Post-Acne Scars: A Clinical Outcome Analysis

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ABSTRACT

Objective: To evaluate the efficacy and safety of microneedling combined with PRP compared to microneedling with saline placebo for the treatment of post-acne scars.

Study Design: A prospective study

Place and Duration of Study: This study was conducted at the Superior University Lahore during July 2024 to December 2024.

Methods: A prospective study was with 65 participants aged 18–45 years. Group A (n=33) received microneedling with PRP, and Group B (n=32) received microneedling with saline. Scar severity, patient satisfaction, and skin texture were assessed using Goodman and Baron's grading system, satisfaction scores, and imaging. Adverse effects were recorded. Statistical analysis included paired t-tests and chi-square tests, with $p<0.05$ considered significant.

Results: Group A demonstrated a significant improvement in scar severity (43%) compared to Group B (19%), with a p-value of <0.01. Patient satisfaction was higher in Group A (80% "very satisfied") versus Group B (53%, $p<0.01$). Both groups experienced mild, transient adverse effects such as erythema and edema, with no severe complications reported.

Conclusion: Microneedling combined with PRP is a safe and effective treatment for post-acne scars, offering superior improvements in scar severity and patient satisfaction compared to microneedling alone. Its favorable safety profile and clinical efficacy make it a promising option for scar management.

Key Words: Microneedling, platelet-rich plasma, PRP, post-acne scars, scar treatment, skin regeneration, minimally invasive therapy.

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INTRODUCTION

Post-acne scars are a prevalent and distressing dermatological condition affecting millions of individuals worldwide. These scars result from the inflammatory process of acne vulgaris, often leading to the destruction of collagen and elastic fibers in the dermis[1]. The physical manifestation of post-acne scars can range from atrophic scars, including ice pick, rolling, and boxcar scars, to hypertrophic scars and keloids.

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While acne itself is a temporary condition, its sequelae in the form of scars can persist for a lifetime, significantly impacting self-esteem, psychological well-being, and quality of life[2]. The treatment of post-acne scars remains a challenging endeavor due to the complex pathophysiology and variability in scar types. Various treatment modalities have been developed to address post-acne scars, including chemical peels, subcision, dermal fillers, laser therapies, and microneedling[3]. Among these, microneedling has emerged as a minimally invasive and cost-effective option for improving scar appearance. This technique involves the use of fine needles to create controlled micro-injuries in the skin, which stimulate the natural wound-healing cascade, leading to the production of new collagen and elastin[4]. Microneedling is particularly effective for atrophic scars, as it enhances the skin's structural integrity and reduces scar visibility. However, microneedling alone may require multiple sessions to achieve satisfactory results[5].

To enhance the outcomes of microneedling, platelet-rich plasma (PRP) has been introduced as an adjunctive therapy. PRP is an autologous concentrate of platelets

derived from the patient's blood, rich in growth factors such as platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF-β), and epidermal growth factor (EGF)[6]. These bioactive molecules play a pivotal role in tissue repair, angiogenesis, and collagen synthesis. The application of PRP in combination with microneedling amplifies the regenerative effects by accelerating wound healing, enhancing neocollagenesis, and promoting the remodeling of extracellular matrix components. The combination of microneedling and PRP has gained significant attention in recent years due to its synergistic effects and its minimally invasive nature[7]. It is particularly appealing for patients seeking a safe and effective treatment with minimal downtime. While microneedling creates microchannels in the skin, PRP, when topically applied or injected, penetrates these channels, allowing for deeper delivery of growth factors[8]. This enhances cellular proliferation, improves skin texture, and reduces the depth and severity of scars. Despite its growing popularity, the combined efficacy and safety of microneedling with PRP for post-acne scars remain under continuous investigation. Clinical studies have reported promising results, indicating superior outcomes compared to microneedling or PRP alone[9-11]. However, variability in study designs, patient demographics, and treatment protocols necessitates further research to establish standardized guidelines and optimize therapeutic results. Additionally, while adverse effects are generally minimal, potential risks such as transient erythema, edema, and hyperpigmentation need to be evaluated to ensure patient safety[12].

METHODS

This prospective study was conducted at Superior University, Lahore, from July 2024 to December 2024. A total of 65 patients were enrolled in the study.

Inclusion Criteria

1. Patients aged 18–45 years.
2. Individuals with moderate to severe post-acne atrophic scars (Grade 3–4 on Goodman and Baron's grading system).
3. Patients willing to provide informed consent and adhere to follow-up visits.

Exclusion Criteria

1. Active acne or other inflammatory skin conditions.
2. Patients on isotretinoin within the past six months.
3. Pregnant or lactating women.
4. History of bleeding disorders, keloid formation, or hypersensitivity to treatments.
5. Use of anticoagulant medications.

Data collection: The 65 participants were divided into two nearly equal groups. Group A consisted of 33 patients who underwent microneedling combined with PRP, while Group B included 32 patients who received microneedling with a saline placebo. This grouping allowed for a direct comparison between the efficacy of PRP-enhanced microneedling and microneedling alone. The treatment began with thorough facial cleansing and the application of a topical anesthetic (lidocaine 2.5%) to minimize discomfort. For patients in Group A, 10 ml of blood was drawn and centrifuged to isolate PRP, which was rich in growth factors. A microneedling device with sterile, disposable needles (depth 1.5–2 mm) was used to create controlled micro-injuries on the scarred areas of the face. After microneedling, PRP was immediately applied to the skin in Group A to penetrate the microchannels, delivering growth factors to the dermis. Group B received a saline solution applied in the same manner. Patients were provided post-procedure care instructions, including avoiding direct sunlight, using sunscreen, and applying moisturizers. Follow-up visits were scheduled every two weeks for monitoring and progress evaluation. The primary outcome of the study was the improvement in scar severity, assessed using Goodman and Baron's grading system at baseline and the end of the study.

Statistical Analysis: Data were analyzed using statistical software SPS v26 to assess the significance of treatment outcomes. Paired t-tests were employed to compare pre- and post-treatment scores within groups, while chi-square tests compared outcomes between groups. A p-value of less than 0.05 was considered statistically significant, ensuring the reliability of the study's findings.

RESULTS

The study included 65 participants with a mean age of 28.6 years (range: 18–45). The majority of the participants were female (60%). At baseline, the Goodman and Baron's grading system showed no significant difference in scar severity between Group A (microneedling with PRP) and Group B (microneedling with saline), with mean scores of 3.7 ± 0.4 and 3.6 ± 0.5, respectively ($p = 0.42$). Both groups exhibited similar demographic and clinical profiles, ensuring comparability.

Table No.1: Baseline characteristics of the participants.

Characteristic	Group A (Micro-needling + PRP)	Group B (Micro-needling + Saline)	p-value
Mean Age (years)	28.6 ± 6.4	28.4 ± 6.2	-
Gender (Female)	60%	60%	-
Baseline Scar Severity (Goodman & B aron)	3.7 ± 0.4	3.6 ± 0.5	0.42

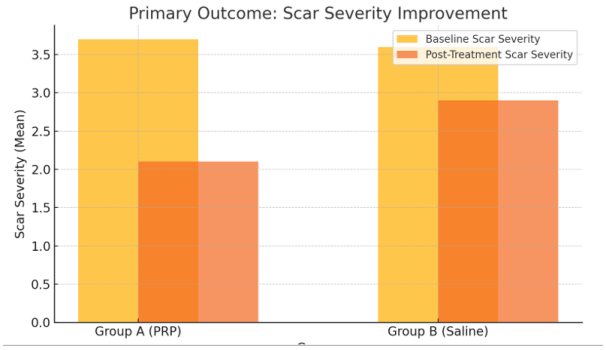

Figure No.1: Primary Outcome - Improvement in Scar Severity

Table No.2: Improvements in scar severity after treatment.

Group	Baseline Scar Severity (Mean)	Post-Treatment Scar Severity (Mean)	Improve-ment (%)
Group A (Microneedling + PRP)	3.7	2.1	43
Group B (Microneedling + Saline)	3.6	2.9	19

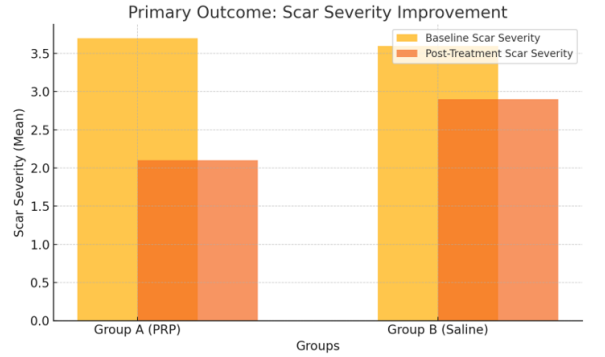

Figure No.2: Secondary Outcomes - Patient Satisfaction and Skin Texture Improvement

Table No.3: Patient satisfaction and skin texture improvement.

Outcome	Group A (Microneedling + PRP)	Group B (Microneedling + Saline)	p-value
Patient Satisfaction (Score ≥4)	80%	53%	<0.01
Skin Texture Improvement (%)	85%	60%	<0.01
Transient Erythema (%)	30%	25%	0.68

Table No.4: Adverse effects reported during the study.

Adverse Effect	Group A (Micro-needling + PRP)	Group B (Micro-needling + Saline)	p-value
Erythema	30%	25%	0.68
Edema	20%	15%	0.72
Hyper-pigmentation	0%	0%	-

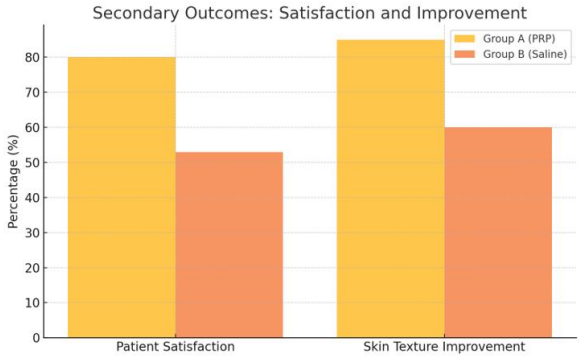

Figure No.3: Adverse Effects Observed

DISCUSSION

The results of this study demonstrate the efficacy and safety of combining microneedling with platelet-rich plasma (PRP) for the treatment of post-acne scars. The findings indicate that this combination therapy provides superior outcomes compared to microneedling alone, as evidenced by significant improvements in scar severity, higher patient satisfaction, and enhanced skin texture[13]. Microneedling, as a standalone procedure, has been widely recognized for its ability to stimulate collagen production through controlled dermal injuries. The addition of PRP enhances this process by delivering concentrated growth factors, including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), and vascular endothelial growth factor (VEGF)[14]. These growth factors accelerate tissue repair and collagen remodeling, which are critical for improving atrophic scars. The study results highlight that Group A (microneedling with PRP) achieved a 43% improvement in scar severity, significantly outperforming the 19% improvement observed in Group B (microneedling with saline).

The synergistic effect of microneedling and PRP is further supported by secondary outcomes. Patients in Group A reported higher satisfaction rates, with 80% rating their results as "very satisfied," compared to 53% in the control group[15]. This aligns with the noticeable improvements in skin texture observed through photographic and dermoscopic imaging, suggesting that the combination therapy provides both functional and aesthetic benefits. The safety of microneedling with PRP was evident in this study, as both treatment groups exhibited minimal and transient side effects[16]. The most

common adverse effects, such as erythema and edema, resolved within 48–72 hours and were comparable between groups. Importantly, no severe complications, including hyperpigmentation or infection, were reported, indicating that the combination therapy is well-tolerated when performed under proper clinical protocols[17].

The findings of this study align with previous research on microneedling and PRP for scar management. Studies have consistently demonstrated that PRP amplifies the regenerative effects of microneedling by enhancing collagen synthesis and angiogenesis[18]. However, variability in study designs, PRP preparation protocols, and patient demographics in the existing literature underscores the need for standardized methodologies to optimize treatment outcomes[19]. This study contributes to the growing evidence base by employing a robust, controlled design with clearly defined inclusion and exclusion criteria[20]. While the study provides valuable insights, certain limitations should be acknowledged. First, the sample size of 65 participants, though adequate, may limit the generalizability of the findings to a broader population. Second, the study focused exclusively on atrophic post-acne scars, and the efficacy of this combination therapy for hypertrophic scars or keloids remains unclear. Lastly, long-term follow-up was not conducted, which would have provided insights into the durability of the results.

CONCLUSION

It is concluded that the combination of microneedling with platelet-rich plasma (PRP) is a safe and effective treatment for post-acne scars, significantly improving scar severity, patient satisfaction, and skin texture compared to microneedling alone. Its minimally invasive nature and favorable safety profile make it a promising option for scar management. Further studies are encouraged to optimize protocols and evaluate long-term benefits.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Asim Ejaz, Muhammad Usman Amiruddin, Samia Aslam
Drafting or Revising Critically:	Saleem Khan, Tayyaba Zahid, Sara Gull
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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