

Combining effect of microneedling with platelet rich plasma versus microneedling alone for management of acne scar: A pilot study

Abstract:

Background: Microneedling (MN) has emerged as a minimally invasive technique for skin rejuvenation. The addition of platelet-rich plasma (PRP) may enhance its efficacy through growth factor stimulation.

Objective: To compare the effectiveness of microneedling combined with PRP versus microneedling alone in treating acne scars.

Methods: A total of 10 patients were enrolled and divided into two groups. Group A received microneedling with PRP, and Group B received microneedling alone. Treatments were conducted over three sessions at one month intervals.

Results: Group A showed a greater improvement in [e.g., skin texture, pigmentation, scar reduction] as assessed by Qualitative and Quartile scar grading system, VAS scale.

Conclusion: The combination therapy demonstrated a synergistic effect and may offer superior outcomes compared to microneedling alone. Larger studies are recommended to validate findings.

Key-words: Microneedling, Atrophic acne scars, collagen induction therapy, platelets rich plasma, growth factors

Introduction:

Acne is a prevalent skin condition that often leads to long-term complications such as post-acne scarring, which significantly affects patients' quality of life. The most common scars are atrophic, and their treatment remains a clinical challenge due to mixed scar types and variable response to therapy. Among various modalities, microneedling (MN) has gained popularity for its ability to stimulate collagen production and enhance skin remodeling through controlled dermal injury.

Microneedling is a minimally invasive, cost-effective procedure that also serves as a transdermal drug delivery system by bypassing the stratum corneum. The release of growth factors during the process supports neocollagenesis and tissue repair. Recent advancements focus on combination therapies to enhance its efficacy, one of the most promising being microneedling combined with Platelet-Rich Plasma (PRP).

PRP is an autologous preparation rich in growth factors, derived from the patient's own blood, and is known for its regenerative properties. It has shown effectiveness in dermatology for wound healing, alopecia, and skin rejuvenation. The synergistic use of microneedling and PRP may amplify collagen production and improve the appearance of acne scars more effectively than microneedling alone.

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This pilot study aims to evaluate and compare the therapeutic outcomes of microneedling with PRP versus microneedling alone in the treatment of post-acne atrophic scars.

Materials and Methods

This split-face pilot study was conducted to evaluate and compare the efficacy of microneedling alone versus microneedling combined with platelet-rich plasma (PRP) in the management of atrophic post-acne facial scars. 10 participants were selected between the age of 18–30 years. All participants were systemically healthy, aesthetically conscious, and provided written informed consent.

Patients with active acne lesions, keloid or keloidal tendencies, bleeding disorders, history of oral steroid or anticoagulant therapy, recent cosmetic facial procedures, or use of systemic retinoids in the past six months were excluded.

TREATMENT

Pre-procedure:

The 10 participants were assigned into two groups according to the side of the face for the split-face study. A comprehensive clinical history was documented using a standardized proforma. A detailed facial examination was performed to evaluate the number, type, and distribution of post-acne scars. Scarring was graded according to the Goodman and Baron system and further classified into icepick, boxcar, and rolling scars as per Jacob et al. Both the physician and patient assessed improvement using the Visual Analogue Scale (VAS). Baseline laboratory tests included complete blood count, bleeding time, clotting time, and serology for HIV, hepatitis B, and hepatitis C. Pre- and post-treatment photographs were taken to document outcomes.

Under aseptic conditions, 10 to 20 milliliters of fresh blood were drawn from the median cubital vein (Fig. 2A) and collected into sodium citrate vacutainer tubes. The tubes were first centrifuged at 1500 rpm for six minutes ("soft spin"), separating the blood into three distinct layers: the bottom red blood cell (RBC) layer (about 55% of the total volume), the top platelet-poor plasma (PPP) layer (approximately 40%), and the middle "buffy coat" layer containing platelet-rich plasma (PRP) as shown in figure 1, which accounts for roughly 5%. Using a Finn pipette, the buffy coat along with some PPP was carefully transferred to a new tube for a second centrifugation ("hard spin") at 2500 rpm for 15 minutes. This process caused the platelets to settle at the bottom of the tube. The concentrated PRP layer was then collected into a sterile tube, and the upper PPP layer was discarded. To activate the

platelet concentrate, calcium chloride was added at a ratio of 1:9 (calcium chloride to PRP) in 1 ml insulin syringes, making it ready for injection into the scarred areas.

Procedure:

The patient's skin was first cleansed with ethyl alcohol followed by ether to remove all oils. A topical anesthetic cream was then applied to the treatment area for 30 minutes. Preparation for microneedling with PRP was done on the right side of the face.

A sterile Dr. Pen electric Dermanpen with 36 nanoneedles was used for the procedure. The patient lay supine with their head stabilized. Using steady, firm pressure, three passes of microneedling were performed on each half of the face—moving the device vertically, horizontally, and diagonally. The skin around the scars was stretched to ensure effective treatment. Each pass created approximately 36 micropunctures per cm², with the device moved back and forth 10 to 20 times in multiple directions. Small pinpoint bleeding appeared at the treatment sites. After bleeding stopped, the area was cleaned with saline-soaked gauze (fig 2).

Half of the PRP, derived from 10 ml of autologous blood, was applied evenly in layers to the left side of the face, followed by microneedling over the PRP-treated area. The patient was briefed about possible postoperative redness and discomfort, and photographs were taken before and after the treatment. The patient was instructed to apply topical vitamin C (ascorbic acid) ointment on the treated skin during the healing process.

Post-operative care:

Vitamin C ointment for enhancing the effect of the procedure was prescribed for all patients. Patients were advised to avoid sun exposure bare skin for at least 1 week. Patients were advised to avoid harsh chemicals or any cosmetic procedure over the face for at least one week. Post procedure sunscreen and emollients were prescribed.

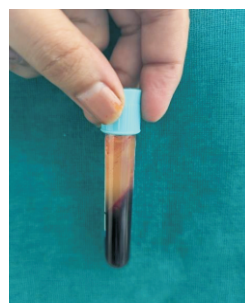


FIG. 1, PRP



FIG. 2, Microneedling procedure

Evaluation:

Patients were assessed post-treatment at 3, 9, and 12 weeks over a three-month period. At each visit, high-resolution facial photographs were taken for documentation. The final scar grading and overall assessment were performed at the 12-week follow-up. Clinical outcomes were compared based on evaluations conducted during these follow-up visits at the 3rd, 9th, and 12th weeks, based on qualitative and quartile scar grading system and VAS scale.

Statistical analysis:

Statistical analysis was performed using the Wilcoxon signed-rank test to compare ordinal scar grades (Goodman and Baron) between the two treatment sides. Quartile grading responses were compared using McNemar's test for paired categorical data. A p -value < 0.05 was considered statistically significant.

Results:

This pilot study included a total of 10 participants with atrophic facial acne scars. A split-face design was employed, wherein each participant received Microneedling with PRP on the right side of the face (Group A) and Microneedling alone on the left side (Group B).

Demographic Profile :

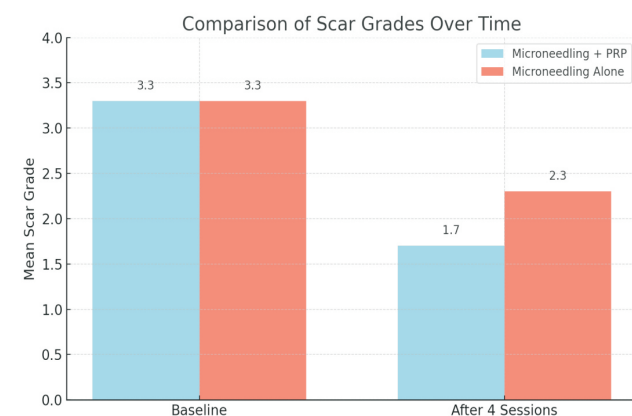
Table 1, Demographic

Parameter	Value
Total patients	10
Mean age	24.3 \pm 3.2 yrs
Gender	6 females, 4 males

Clinical Improvement (Goodman and Baron's Scale)

Table 2, Clinical Improvement

Time Point	Group A (Microneedling + PRP)	Group B (Microneedling Alone)
Baseline	Grade 3 in 70%, Grade 4 in 30%	Grade 3 in 70%, Grade 4 in 30%
After 4 sessions	Grade 1 in 40%, Grade 2 in 50%, Grade 3 in 10%	Grade 2 in 70%, Grade 3 in 30%



Satisfaction Score (0–10 Scale):

Group	Mean Satisfaction Score
Microneedling + PRP	8.1 \pm 0.7
Microneedling alone	6.3 \pm 1.0

There was a statistically significant improvement in scar grades on the side treated with microneedling combined with PRP compared to microneedling alone (Wilcoxon signed-rank test, $p < 0.05$). Quartile-based improvement also favored the PRP-treated side, with a higher proportion of patients achieving $>50\%$ scar reduction (McNemar's test, $p < 0.05$).



FIG 3(A) Pre OP image of Group A patient.



FIG 3(B) 12 week follow-up picture of MN+PRP

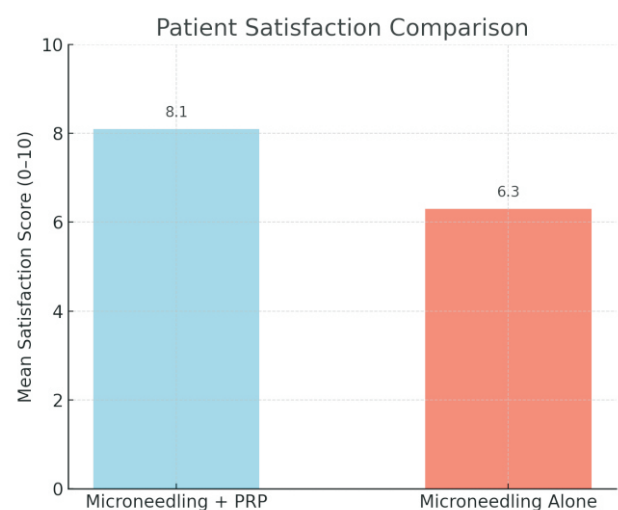




FIG 4(A) Pre OP Image of Group B Patient

FIG 4(B) 12 week Follow up Image of MN.

Conclusion:

This pilot study demonstrates that the combination of microneedling with platelet-rich plasma (PRP) is more effective in the treatment of atrophic acne scars compared to microneedling alone. Patients treated with PRP showed greater clinical improvement, higher patient satisfaction, and a more significant reduction in scar grade as assessed by Goodman and Baron's qualitative grading system and quartile improvement scales. These findings suggest that PRP enhances the regenerative effects of microneedling, making it a promising adjunctive therapy for acne scar management. However, larger randomized controlled trials are warranted to validate these results and establish long-term efficacy and safety.

Discussion:

Acne scars, particularly atrophic ones, are challenging to treat and significantly impact patients' quality of life. Among the various modalities available, microneedling has gained popularity due to its ability to induce neocollagenesis through controlled dermal injury, promoting skin remodeling. When combined with Platelet-Rich Plasma (PRP), a rich source of growth factors that stimulate healing and regeneration, the therapeutic outcome can be enhanced.

Our pilot study found that the combination of microneedling with PRP (Group A) resulted in more pronounced improvements in scar texture, depth, and patient satisfaction compared to microneedling alone (Group B). This finding aligns with numerous prior studies supporting the synergistic effect of combining microneedling with PRP.

Sharad (2011) was one of the earliest to demonstrate that PRP combined with dermaroller therapy significantly improved atrophic acne scars compared to dermaroller alone in a split-face study[1]. **Chawla (2014)** further confirmed these findings, noting a 60–80% improvement in the microneedling + PRP group versus 40–50% in the microneedling + vitamin C group[2].

Nofal et al. (2014) conducted a randomized split-face study showing that patients receiving PRP and microneedling had significantly better outcomes and faster recovery than microneedling alone[3]. **Gawdat et al. (2014)** emphasized that PRP augments collagen remodeling and vascularization in acne-scarred skin, improving elasticity and texture[4].

Histological evidence supports these clinical findings. **El-Domyati et al. (2018)** demonstrated increased collagen and elastin fibers in PRP-treated areas post-microneedling[5]. Additionally, **Yadav et al. (2017)** observed clinical improvement in acne scar depth and patient satisfaction, although their statistical significance was moderate, emphasizing the need for proper patient selection[6].

Recent meta-analyses also echo these results. A systematic review by **Abdel-Motaleb et al. (2021)** reported that combining PRP with microneedling showed better results in scar depth reduction and skin texture improvement than microneedling alone[7]. Similarly, **Fabbrocini et al. (2020)** described PRP as a safe, effective adjuvant that enhances wound healing and neocollagenesis in various dermatologic procedures[8].

Other randomized studies, such as those by **Nita et al. (2019)** and **Badran et al. (2020)**, reinforced the statistically significant superiority of microneedling combined with PRP in reducing both qualitative and quantitative acne scar scores[9][10].

The therapeutic mechanism of PRP lies in the release of growth factors such as PDGF, TGF- β , VEGF, and EGF, which collectively stimulate fibroblast proliferation, collagen production, and angiogenesis. Microneedling facilitates better penetration of PRP into deeper dermal layers, thereby enhancing the regenerative cascade.

While our study supports these findings, it is limited by a small sample size and a relatively short follow-up duration. Despite these constraints, the observed clinical improvements were consistent with the literature, underlining the potential of this combination therapy as a promising approach for acne scar management.

Future studies with larger cohorts, standardized PRP preparation protocols, and longer follow-up periods are recommended to validate and optimize this treatment modality.

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