

# A split face comparative study to evaluate the efficacy of skin microneedling and platelet rich plasma (PRP) combination versus skin microneedling alone for treatment of post acne scars

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## Abstract

**Background** Treatment of acne scars involves a concoction of various treatment modalities. Minimally invasive procedures like microneedling along with platelet rich plasma are new combination modalities used for scar remodeling with lesser downtime and side effects.

**Methods** The present study was conducted on 40 patients having Goodman and Baron's acne scar grade II-IV. The efficacy of PRP in combination with microneedling was compared to microneedling alone in the treatment of post acne scars. Right half of the patient's face was taken as study side where microneedling was done followed by PRP injections. The left half of the same patient's face was taken as control side where microneedling was done followed by normal saline injections.

**Results** The combination therapy of microneedling along with PRP improved the scar grading significantly, with the decrease of the mean of Goodman and Baron's grade from  $3.20 \pm 0.40$  at baseline, to  $2.13 \pm 0.56$  at final treatment whereas on the left half of patient's face mean acne scar grade reduced from  $3.20 \pm 0.40$  to  $2.36 \pm 0.56$  at final treatment.

**Conclusion** Combination approach using dermaroller and PRP is a better option than using dermaroller alone in atrophic acne scars for clinical improvement although the association is not statistically significant.

## Key words

Microneedling, platelet rich plasma, acne scars, Dermaroller.

## Introduction

Acne vulgaris is a common disorder of pilosebaceous unit. Severely inflamed papulopustular and nodulocystic lesions result in post acne scars, associated with lowered self

esteem and severe psychological distress thus mandates appropriate treatment.<sup>1</sup> Facial scarring affects both sexes equally and occurs in 75% of patients of acne.<sup>2</sup> Though many treatment options like subcision, microneedling, peels, platelet rich plasma (PRP), tissue augmentation techniques, ablative and non ablative lasers are available for treating post acne scars but optimized treatment still does not exist.<sup>3</sup> The varying morphologies of acne scars, especially when multiple types of scars are found in the

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same patient, suggest the need for combination therapy to provide better outcome. Thus the present study was conducted with an aim to evaluate the efficacy of microneedling in combination with PRP versus microneedling alone in the management of post acne scars. The safety profile of PRP was also analysed by documenting adverse effects reported with the treatment.

## Methods

This prospective split face comparative study was carried out in a tertiary care hospital over a period of one year after taking approval from institution ethical committee. 40 patients who had Goodman and Baron acne scar grade II –IV were enrolled in the study.<sup>4</sup> It was a split face study in which the right half of patient's face was taken as study side where microneedling was done followed by platelet rich plasma (PRP) injections whereas on the left half of patient's face skin microneedling was followed by normal saline injections. Total 4 such treatment sessions were given at an interval of 4 weeks. Final follow up was done 6 months after the last session. During each visit following assessment parameters were used to assess the outcome.

1. Goodman and Baron's qualitative acne scar grading system (G&B AQGS): Acne scars before and after treatment were graded using the above mentioned scale.
2. scar quartile grading scale (SQGS) - degree of improvement was evaluated by pre and post procedural digital photographs assessed by an independent blinded dermatologist and results were graded on the basis of the percentage improvement as follows: Grade 0- no improvement, Grade 1: Less than 25% improvement; Grade 2: 26-50% improvement; Grade 3: 51-75% improvement; Grade 4: More than 75% improvement.

**Statistical analysis** Data analysis was done using SPSS (Statistical package for social sciences) version 16.0 software. Wilcoxon signed rank test was used to compare Goodman and Baron grade before and after treatment. P value of less than 0.05 was considered to be statistically significant.

**Inclusion criteria** Adult males and females between 18 and 45 years of age with Goodman and Baron's acne scar grade II- IV and who gave informed written consent. Patients with same Goodman and Baron's grade on both sides of face were selected to avoid bias.

**Exclusion criteria** Patients with active acne, history of keloids, active herpes infection, Platelet count less than  $1\text{ lakh}/\text{cm}^3$ , hemoglobin less than  $10\text{mg}/\text{dl}$ , HIV seropositivity and pregnant females.

Technique of microneedling and PRP injections- The procedure was done under topical anesthesia (combination of prilocaine 2.5% and lignocaine 2.5%) under occlusion for about 45 min before the procedure. Microneedling was done with a dermaroller (Dermaroller G, DermaIndia, microarray of needles (1.5mm depth) arranged circularly in 24 rows of 8 needles each making a total of 192 needles). It was rolled over the scars in 4 different directions each perpendicular to the other till pinpoint bleeding was observed. Double spin method was used to prepare PRP. Injections were given intradermally through a 30G needle. The amount injected was sufficient to elevate and blanch the scar. Injection sites were located within 2 cm intervals to receive 0.2 ml platelet-rich plasma or normal saline. The total amount injected was 1–2 ml depending on the number of scars. Intermittent treatment in the form of topical sunscreen and strict photoprotection was advised.

**Results**

A total of 40 patients (27 females, aged 24.80±7.87; 13 males, aged 25.95±5.59) were recruited. Most of the patients belonged to Fitzpatrick skin type 4 (47.5% patients) and acne scar grade IV (45.0% patients) (Table 1). The combination therapy of microneedling along with PRP improved the scar grading significantly, with the decrease of the mean of Goodman and Baron’s grade from 3.20±0.40 at baseline, to 2.13± 0.56 at final treatment, to 1.67±0.47 six months after the completion of therapy. On the left half of patient’s face mean acne scar grade reduced from 3.20±0.40 to 2.36± 0.56 at final treatment, to 1.97±0.37 six months after the completion of therapy. Using Wilcoxon signed rank test, improvement was statistically significant (p= 000) on both sides of the face with insignificant difference between the two modalities (p = 0.118) (Table 2). Another assessment parameter used was SQGS- on the right half, 3 patients showed more than >75% improvement, 5 patients showed 51-75% improvement, 21 patients showed 26-50% improvement, 10 patients showed <25% improvement whereas on the left half >75%

improvement was seen in 2 patients, 51-75% improvement in 3 patients, 26-50% improvement in 18 patients, < 25% improvement in 14 patients (Table 3). The most common side effect reported was erythema (15% patients) followed by edema (12.5%). There was no difference in side effects observed whether microneedling was done along with or without PRP (Table 4).

**Table 1** Demographic profile of study population

	No. of patients	Percentage
Age group		
<20 (years)	5	12.5%
21-25	16	40.0%
26-30	9	22.5%
>30	10	25.0%
Males	13	32.5%
Females	27	67.5%
Goodman and Baron’ acne scar grade		
II	8	20.0%
III	14	35.0%
IV	18	45.0%
Fitzpatrick skin type		
3	9	22.5%
4	19	47.5%
5	12	30.0%

**Table 2** Showing comparison of G&B AQGS before and after 4<sup>th</sup> session

Side of face	Before treatment		After 4 <sup>th</sup> session		Wilcoxon signed rank test	P value	Mean %age change in G&B AQGS	SD	P value
	Mean	SD	Mean	SD					
	G&B AQGS		G&B AQGS						
Study	3.20	0.40	2.13	0.56	-3.601	0.000*	33.43%	11.23	0.118
Control	3.20	0.40	2.36	0.49	-3.806	0.000*	26.25%	10.12	**

**Table 3** Comparison of microneedling along with PRP versus microneedling along with normal saline injections for management of post acne scars (before and after 4<sup>th</sup> session).

	Improvement Grade					Total	P value
	(Grade 0)	(Grade 1)	(Grade 2)	(Grade 3)	(Grade 4)		
	No improvement	< 25%	26-50%	51-75%	>75%		
Microneedling + PRP	1	10	21	5	3	40	0.362**
Microneedling + normal saline	3	14	18	3	2	40	

**Table 4** Comparison of side effects between study and control sides.

Side effects	Study side (microneedling + PRP)	Control side (microneedling+ normal saline)
Erythema	6 (15%)	6 (15%)
Edema	5(12.5%)	5 (12.5%)
Infection ( micropustules over the face)	2 (5%)	2 (5%)
Post inflammatory hyperpigmentation	1(2.5%)	1 (2.5%)



**Figure 1** 1) Right half of patient's face 1-baseline, 2) after 4 sessions, 3) on followup after 6 months



**Figure 2** 1) Left half of patient's face 1-baseline, 2) after 4 sessions, 3) on followup after 6 months



**Figure 3** 1) Right half of patient's face 1-baseline, 2) after 4 sessions, 3) on followup after 6 months.



**Figure 4** 1) Left half of patient's face 1-baseline, 2) after 4 sessions, 3) on followup after 6 months.

## Discussion

Microneedling is an efficacious procedure to induce neocollagenesis without ablation of the epidermis therefore minimizing post procedure downtime.<sup>5</sup> This procedure creates minute channels for effective absorption of topical agents like PRP which serves as source of autologous growth factors, especially epidermal growth factor, platelet-derived growth factor, transforming growth factor beta, and vascular endothelial growth factor, that act in coherence with growth factors induced by skin needling, to enhance collagen remodeling and wound-healing cascade.<sup>6</sup> Skin needling by controlled epithelial injury also induces release of potassium and proteins from epithelial cells which lead to change in electrical potential and conductivity of interstitium resulting in migration of fibroblasts and formation of neocollagen at the site of epithelial injury.<sup>7</sup> There are various studies conducted in literature supporting the role of microneedling as an effective treatment modality for collagen induction in post acne scars. Aust *et al.* showed a 40-percent increase in thickening of the epidermis and significant collagen deposition at one year post microneedling therapy.<sup>8</sup> Similarly Fernandes and Signorini showed that the skin became thicker with much greater collagen deposition leading to improvement in atrophic acne scars after skin needling.<sup>9</sup> In present study,

mean age of study population was  $24.34 \pm 6.87$ ; females outnumbered males with female: male ratio 2.07:1. Similar findings were reported in a study done by Porwal S *et al.*<sup>10</sup> however Goulden *et al.* observed scarring more in male in their study.<sup>11</sup> In our study maximum number of patients belonged to age group 21-25 years. Majid *et al.* observed age of the patients ranged from 13 to 34 years, with the mean age of 22.4 years.

Present study has shown that microneedling in combination with PRP has significantly improved mean baseline acne scar grade from  $3.20 \pm 0.40$ , to  $2.13 \pm 0.56$  at final treatment, to  $1.67 \pm 0.47$  six months after the completion of therapy where as on the left half of patient's face microneedling alone has reduced acne scar grade from  $3.20 \pm 0.40$  to  $2.36 \pm 0.56$  at final treatment, to  $1.97 \pm 0.37$  six months after the completion of therapy. Similar statistically significant results after the combination therapy have been reported by Nofal *et al.* in 45 patients with acne scars.<sup>12</sup> Fabbrocini *et al.* compared skin needling combined with topical application of PRP in a split face trial of 12 patients. After treatment, all scores were reduced but the PRP group had and overall mean lower severity score.<sup>13</sup> In another study done by Yassen U *et al.* showed that after treatment with microneedling in combination with PRP, 6 patients with grade IV acne scars

moved to grade II, 9 patients with grade III scars improved by 2 grades and all 8 patients with grade I were left with no scars at the end of the treatment.<sup>14</sup> Chawla S *et al.* reported that Out of 30 patients, 23 achieved reduction in scarring by one or two grades after combination of microneedling with PRP in post acne scars.<sup>15</sup> In present study side effects noted were – erythema (15% patients), edema (12.5% patients), infection (5% patients) and post inflammatory hyperpigmentation in one patient only. There was not much difference between the two groups in occurrence of side effects. Similar finding were documented in a study done by Porwal *et al.*, Yasseen U *et al.* and Majid I.<sup>10,14,16</sup>

**Limitations** Lack of effective tools to correctly measure either baseline acne scarring grade or response to treatment. G&B AQGS and SQGS were crude, subjective with very high index of observer bias.

## Conclusion

Our study asserts that microneedling along with PRP appears to be a better therapeutic modality than microneedling alone for the treatment of acne scars although the difference is not statistically significant. Also this combination procedure does not require expensive equipment and could be done in all skin type patients as post-inflammatory hyperpigmentation is rarely seen after the therapy.

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