

# A comparative study of efficacy of micro-needling alone versus micro-needling with autologous platelet rich plasma in facial atrophic acne scars

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**Abstract**— Post acne scarring is a consequence of abnormal resolution or wound healing following the damage that occurs in the sebaceous follicle during acne inflammation. The present study was undertaken to compare the improvement in facial atrophic acne scars by micro-needling alone and combination of micro-needling with autologous platelet rich plasma (PRP). A prospective, observer blinded, comparative interventional study was conducted on 50 patients of facial atrophic acne scars fulfilling inclusion criteria. They were randomly divided into two group of 25 each i.e. group 'A' (micro-needling alone) and group 'B' (micro-needling with PRP). Three sessions on monthly interval were conducted and Final follow up was done at 4<sup>th</sup> month. They were evaluated by Goodman and Baron's quantitative and qualitative grading scale, for clinical improvement and for patient's satisfaction. Although qualitative and quantitative improvement was observed in both the groups but the improvement in group 'B' was more than 'A' on Goodman and Baron's quantitative and qualitative grading scale, however it was not statistically significant. On clinical improvement and on patient satisfaction, group 'B' had better results than group 'A' which was statistically significant ( $p < 0.05$ ). It was concluded that Micro-needling with autologous PRP is simple, safe and cost-effective procedure for facial atrophic acne scars. Micro-needling when combined with autologous PRP provides better overall clinical improvement. It is suggested that PRP should be considered as an adjuvant therapeutic option along with micro-needling in the management of atrophic acne scars.

**Keywords:** Micro-needling, Goodman and Baron's quantitative and qualitative grading scale, post acne scar, Platelet Rich Plasma (PRP).

## I. INTRODUCTION

Acne is a chronic inflammatory disease of the pilosebaceous units characterized by seborrhoea, the formation of open and closed comedones, erythematous papules, pustules nodules, deep pustules and pseudocysts. In many cases a degree of scarring will ensue.<sup>1</sup> Abnormal resolution or wound healing following the damage that occurs in the sebaceous follicle during acne inflammation results in post acne scarring. The pathogenesis of acne is currently attributed to multiple factors, such as increased sebum production, alteration of the quality of sebum lipids, androgen activity, proliferation of Propionibacterium acnes (P. acnes) within the follicle and follicular hyperkeratinisation.<sup>2</sup>

Atrophic acne scars are more common than keloids and hypertrophic scars with a ratio 3:1.<sup>3,4</sup> They have been sub-classified into ice pick, boxcar scar, and rolling scars. Goodman and Baron proposed a qualitative scale and then presented a quantitative scale.<sup>5,6</sup> Dreno et al. introduced the ECCA scale (Echelle d'Evaluation Clinique des Cicatrices d'Acne).<sup>7</sup>

Various treatment modalities are available for acne scars such as surgical techniques (punch graft, punch excision, subcision), micro-needling resurfacing techniques (dermabrasion, ablative laser treatment, chemical peels), non-ablative laser treatment, autologous fat transfer and injection of dermal fillers.

Micro-needling is a simple, inexpensive office procedure with minimal downtime and no serious side effects. Various studies have been done to establish the efficacy of this procedure.<sup>3,8-11,15,16</sup>

PRP is defined simply as plasma containing an above baseline concentration of platelets.<sup>8</sup> It contains an effective concentration of multiple fundamental growth factors (GFs) by virtue of platelet alone and plasma proteins, namely fibrin, fibronectin and vitronectin.<sup>9</sup> Degranulation of pre-packaged GFs occurs in platelets upon "activation". The secreted GFs bind to their respective transmembrane receptors and augment the natural wound-healing process.<sup>10,11</sup>

So this study was conducted to compare the effect of micro-needling alone and micro-needling with PRP in atrophic acne scars.

## II. METHODOLOGY

A prospective, observer-blinded, comparative interventional study was conducted in the Department of Skin and VD at J L N Medical College and Hospital, Ajmer, Rajasthan.

This study includes total of 50 patients of atrophic acne scars fulfilling inclusion criteria. A written informed consent was taken. Computer generated random table was used to randomize the sample and they were divided into two groups of 25 each i.e. group 'A' (micro-needling alone) and group 'B' (micro-needling with PRP). The study was approved by ethics committee of Rajasthan University of health sciences. Patients of age 15-35 years with atrophic scars > grade 2 of duration more than 6 months were included in the study. Patients with history of use of topical or systemic retinoids during past 6 months, permanent fillers injected in past 3 years and allergic reaction to local anaesthetics, tendency for keloid formation, collagen or elastin disorders, usage of topical steroids, pregnancy and lactation, HIV and infective Hepatitis, active or recurrent herpes simplex infection, premalignant and malignant skin conditions, other active dermatoses/ eczematous conditions, active bacterial infections, diabetes, unrealistic expectations and those on anticoagulant therapy and bleeding disorders were excluded. Baseline evaluation of CBC, clotting time and bleeding time, Random blood sugar, HIV, HBsAg, Anti HCV, Urine analysis were done.

### 2.1 Platelet rich plasma preparation

A two-stage (separation and concentration) centrifuging process was employed in the preparation of platelet-rich plasma. PRP Centrifuge machine was pre-cooled upto 20°C for 10 minutes. 8.5 ml of whole blood was drawn from the patient by venipuncture and transferred into vacutainer containing 1.5ml of ACD-A (acid citrate dextrose-A) anticoagulant. The vacutainer was labelled and centrifuged at 2500 rpms for 7 minutes. After the centrifugation, the plasma, buffy coat and superficial RBC layer were aspirated and transferred to a plain vacutainer (not having anti-coagulant). This was again centrifuged at 3000 rpms for 6 minutes. After the centrifugation, about upper 3/4<sup>th</sup> of platelet poor plasma is discarded and the concentrated PRP at the lower 1/4<sup>th</sup> was resuspended and obtained in a sterile insulin syringe. For each patient 1- 1.5 ml PRP was prepared.

## 2.2 Assessment

Clinical photographs were taken before and after each visit and 1 month after the last treatment. They were evaluated by Goodman and Baron's quantitative and qualitative grading scale. Two independent dermatologists evaluated and compared the photographs using a quartile grading system (poor improvement [ $< 25\%$ ], fair improvement [ $26-50\%$ ], good improvement [ $51-75\%$ ], excellent improvement [ $>75\%$ ]). In addition, Patients were asked to rate their satisfaction for treatment after the 2<sup>nd</sup> session and 1 month after the last session i.e. follow up at 4<sup>th</sup> month, using a quartile grading system [(0-unsatisfied, 1-slightly satisfied, 2-satisfied, 3-very satisfied)]. All adverse effects during the study were also recorded.

## 2.3 Statistical analysis

Quantitative data was expressed in mean $\pm$ SD and significance of difference in means were inferred by unpaired 't' test. Quantitative data was expressed in proportions and significance of difference in proportions was inferred by chi-square test.

### III. RESULT

A total of 50 atrophic acne scar patients were included 25 in each of the two group i.e. group 'A' (micro-needling alone) and group 'B' (micro-needling with PRP).

As per Goodman and Baron Qualitative Grading system, in Group A, at baseline there were 19 (76%) and 6 (24%) patients in grade 4 and 3 respectively. One month after the third session i.e. at final follow up at the fourth month, there were 9 (36%), 14 (56%) and 2 (8%) patients in grade 4, 3 and 2 respectively. In Group B, at baseline there were 16 (64%) and 9 (36%) patients in grade 4 and 3 respectively. At follow up at the fourth month, there were 6 (24%), 11 (44%) and 8 (32%) patients in grade 4, 3 and 2 respectively. In both the groups there was a decrease in number of patients of severe grade from baseline as the patients shifted towards the moderate and mild grades. However, no significant difference was observed in both the groups. (Table 1)

At the end of 4 months, in group A, there was shift of one grade in 13(52%) patients with grade 4 and 3 scarring and no shifting was seen in 12 (48%) patients. While in group B, there was shift of one grade in 18(72%) patients with grade 4 and 3 scarring and no shifting was seen in 7 (28%) patients. (Table 1)

**Table 1**  
**Comparison of Both groups at baseline and follow up at 4 months as per Goodman and Baron Qualitative Grading system**

Grade	Baseline				Follow up at 4 month			
	Group 'A'		Group 'B'		Group 'A'		Group 'B'	
	No.	%	No.	%	No.	%	No.	%
1	0	0	0	0	0	0	0	0
2	0	0	0	0	2	8	8	32
3	6	24	9	36	14	56	11	44
4	19	76	16	64	9	36	6	24
<b>P Value</b>	0.5380				0.1056			

As per Goodman and Baron Quantitative Assessment system, in Group A, the mean score at baseline was 22.48 $\pm$ 7.87 which decreased to 18.88 $\pm$ 6.90 at 4th month. Similarly in group B, the mean score at baseline was 21.96 $\pm$ 6.78 which decreased to 16.60 $\pm$ 5.71 at 4th month. A decrease in the mean scores

was observed in both the groups but there was a more decline of scoring in group B when compared with group A, however it was not statistically significant ( $p = 0.244$ ). (Table 2)

**Table 2**  
**Comparison of Goodman and Baron Quantitative Grading Scores of Both groups at baseline and follow up at 4 months**

Group		Baseline	Follow up at 4 month
Group 'A' (N=25)	Mean	22.48	18.88
	Std. Deviation	7.87	6.90
Group 'B' (N=25)	Mean	21.96	16.60
	Std. Deviation	6.78	5.71
p value		<b>0.8035</b>	<b>0.2444</b>

At 2<sup>nd</sup> session, fair improvement was seen only in 16% patients in group A. while there were fair improvement in 48% patients in group B ( $P = 0.0622$ ). At Follow up at 4 month, in group A there were good improvement in 24% patients and fair improvement in 68% patients. while in group B fair, good and excellent improvement were seen in 36%, 56% and 8% patients respectively with  $p$  value  $< 0.05$  ( $p=0.003$ ) which was statistically significant. [Fig 1 to Fig 4]

**Figure 1**  
**Photographs of atrophic acne scars at Baseline and after 4 months of follow ups of treatment**



None of the patients was satisfied or very satisfied in both groups at 2<sup>nd</sup> session. But at Follow up at 4 month, in group A only 12% patients stated that they were satisfied followed by 48% slightly satisfied.

While in group B 12% are very satisfied and 40% are satisfied. This difference was found significant ( $p = 0.0065$ ).

In this study, average 34% didn't have any post procedure side effects in both groups. Most common side effect was erythema which was immediate and used to persist till 4-7 days. However, there were lesser side effects in group 'B' than group 'A'.

#### IV. DISCUSSION

At the time of presentation in this study, the mean duration of post acne scarring in group 'A' was 32.44 months and in group 'B' it was 30.04 months. Almost similar was observed by Gawdat et al., the mean duration of acne scars was seen to be 37 months and 39.6 months in group A and B, respectively.<sup>3</sup>

In group 'A' according to the Goodman and Baron's qualitative acne scar scoring at baseline, there were 19 (76%) and 6 (24%) patients in grade 4 and 3 respectively. At final follow up at the fourth month, there were 9(36%), 14 (56%) and 2 (8%) patients in grade 4, 3 and 2 respectively. At the final follow up, in group A, there was shift of one grade in 13(52%) patients with grade 4 and 3 scarring and no shifting was seen in 12(48%) patients. And in Group 'B', at baseline there were 16 (64%) and 9 (36%) patients in grade 4 and 3 respectively. At final follow up at the fourth month, there were 6(24%), 11 (44%) and 8 (32%) patients in grade 4, 3 and 2 respectively. At the end of 4 months in group B, there was shift of one grade in 18(72%) patients with grade 4 and 3 scarring and no shifting was seen in 7(28%) patients.

On comparing both the groups in terms of qualitative grading, a decrease in the severity of acne grade was observed in both the groups. There was a decrease in number of patients with grade 4 scarring, with a simultaneous increase in the number of patients in the grade 3 and grade 2. This represents the shift of the patients towards the decrease in the severity of acne grade. Though not statistically significant, this shift was more in the patients in group B as compared to group A. Also there was no improvement seen in 48% of cases in group A as compared to 28% cases in group B. Since both the groups were comparable in terms of qualitative grading, this added improvement in group B may be attributed to the adjuvant effect of the growth factors provided by the PRP.

In a study conducted by Imran Majid et al.<sup>17</sup> for efficacy of micro-needling in facial atrophic scars in 36 patients consisting of 16.67% patients in grade 4, 58.33% patients in grade 3 and 25% patients in grade 2. They observed a shift by two grades in 72.2%, and shift by one grade in 16.7% and no shift in grades in 11.1% patients.<sup>17</sup> This is in contrast to our study in which 48% patients did not show any shift in the qualitative scoring. This may be due to the reason that our study consisted of 76 % in grade 4 as compared to their study in which there were only 16.67% patients with grade 4. It may be the result of the limitation of micro-needling treatment that Grade 4 scars do not respond as well as to this treatment as Grade 3 and Grade 2 scars.

There are very limited studies to compare the results of micro-needling with PRP based on the Goodman and Baron's qualitative grading system. As PRP is a new addition to the armamentarium of the treatment of acne scars. According to our observations micro-needling when done along with PRP application was more efficacious than micro-needling alone. However, further studies are required for establishing the superadded or adjuvant effect of PRP in combination with micro-needling in the management of acne scars.

In this study, Goodman and Baron's quantitative acne scar assessment score in group A, the mean score at baseline was  $22.48 \pm 7.87$  which decreased to  $18.88 \pm 6.90$  at follow up 4th month. Similarly in group B, the mean score at baseline was  $21.96 \pm 6.78$  which decreased to  $16.60 \pm 5.71$  at follow up 4th month. As per the observations of the study by Dogra S et al.<sup>18</sup> for the efficacy of micro-needling in acne scars, the baseline mean acne scar score was  $11.73 \pm 3.12$  and after 5 months it decreased to  $6.5 \pm 2.71$ . The result in our group A (micro-needling alone) at the end of the study corresponds to a similar pattern observed by Dogra et al.<sup>18</sup> In a split face study by Fabbrocini et al.<sup>16</sup> for comparing micro-needling alone and micro-needling with PRP, on the side treated by micro-needling alone the mean acne severity score reduced from 7.5 to 4.9 whereas on the side treated with micro-needling with PRP the score went from 7.5 to 4. They observed better results on the side treated with micro-needling with PRP. Though not statistically significant, we also observed greater improvement when micro-needling was combined with PRP.

In the study by Imran Majid et al.<sup>17</sup> for studying efficacy of microneedling, they subjectively rated the improvement on a 10 point scale with 7-10, 4-6, and < 4 as excellent, good and poor. And 80.55% of their patients rated the improvement to be between 7 to 10 (excellent), 11.11% of them observed improvement between 4 – 6 (good) and 8.3 % of them as < 4 (poor).

This difference in this and their study may have been due to the severity of acne scars, as it was more in our current study groups leading to an overall decreased sense of improvement in this study. It may also be due to more distress, anxiety and expectations of the patient from the treatment.

In the split face study of micro-needling and micro-needling with PRP by Fabbrocini et al. the patients were more satisfied with the side subjected to micro-needling along with PRP.<sup>16</sup> In this study in group 'B', 8% reported excellent improvement, whereas 36% and 56% observed fair and good improvement.

Dogra et al.<sup>18</sup> reported an improvement of 50-75% in majority of their patients, with all the patients showing an improvement of >25% in acne scars when compared with the baseline photographs. In the study by Fabbrocini et al. they observed a more improvement on the side treated with micro-needling with PRP as compared to the site treated with micro-needling alone, which was statistically significant.<sup>16</sup>

In this study, similar results were noted on photographic assessment, by blinded dermatologists, at the end of the study, in group A, 8% patients observed improvement between 1 to 25 %, in 68 % patients an improvement of 25-50% was noted and in 24% patients an improvement of 50-75% was observed. In group B, in 36% patients an improvement of 25-50% was noted, in 56% patients an improvement of 50-75% was observed and 8% patients observed improvement between > 75%. All of the patients had some degree of improvement when the baseline photographs were compared with the photographs at final follow up.

The difference between the two groups was seen to be statistically significant  $p < 0.05$  (0.003). This is again in support of the role of PRP in enhancement of the results of micro-needling which may be again being explained on the basis of growth factors provided by PRP.

At Follow up at 4 month, in group A only 12% patients stated that they were satisfied followed by 48% patients were slightly satisfied while in group B 12% patients are very satisfied and 40% are satisfied. There was significant difference observed with  $p$  value  $< 0.05$  ( $P = 0.0065$ ) and Patients were more satisfied with the treatment given to group B as compared to group A.

## V. CONCLUSION

It was concluded from this study that Micro-needling with autologous PRP is simple, safe and cost-effective procedure for facial atrophic acne scars. Micro-needling when combined with autologous PRP provides better overall clinical improvement. It is suggested that PRP should be considered as an adjuvant therapeutic option along with micro-needling in the management of atrophic acne scars.

## CONFLICT OF INTEREST

None declared till now.

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