

Comparison of outcome of microneedling with autologous platelet rich plasma versus topical vitamin C for the treatment of acne scars

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Abstract

Objective Acne vulgaris is a common chronic skin disease occurring in adolescence. It involves blockage and inflammation of pilosebaceous units. It is usually self-limiting but in 20% of affected individuals it can lead to scarring. The objective of the study is to compare and evaluate efficacy of Micro needling with PRP versus micro needling with vitamin C in treatment of atrophic acne scars.

Methods This study was conducted in a government based tertiary care hospital free of any cost. Total number of patients included was 28. Two groups were made; Group (A) was treated with microneedling with PRP and Group (B) was treated with microneedling with vitamin C using Derma pen, containing an array of microneedles arranged circularly. Each group comprised of fourteen patients.

Results Goodman's and Baron quantitative and qualitative grading of acne scars was used to assess baseline and result. Physician's assessment was used to grade treatment response as poor, good, and excellent.

Conclusion Physician's assessment of improvement showed excellent response in 3 patients, good response in 8 patients and poor response in 3 patients in Group (A). Physician's assessment showed an excellent response in 1 case, good response in 7 patients and poor response in 6 patients Group (B).

Key words

Micro-needling; Platelet rich plasma; Acne scars; Topical vitamin C.

Introduction

Increasing sebaceous gland activity under hormonal influence of dihydroepiandrosterones and bacteria cutibacterium acnes, commonly starts in teenage years. In some patients, the severe inflammatory response leads to post acne scars. Acne can leave various types of scars after healing, which may present as depressed scars or hypertrophic or keloidal. Depressed or atrophic

scars may be of gentle contour (boxcar scars) or like deep pits (icepick scars). It is common for patients to have more than one type. The lesions can be assessed using Goodman's Qualitative and Quantitative grade as given in **Tables 1, 2**. Qualitative scale is based on the type of lesion, depth of scar and visibility of lesion, having been categorized in four grades of severity.¹ Quantitative score is based on individual lesion count. Different treatment options like dermabrasion, chemical peeling and laser resurfacing are available. Scar re modeling with autologous PRP and topical vitamin C has minimal side effects as compared to the other

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Table 1 Goodman's Qualitative Scarring Grading System. [1]

Grade of scar	Level of disease	Clinical features
1	Macular	Erythematous, hyper- or hypopigmented flat marks. No problem of contour but of color.
2	Mild	Mild atrophy or hypertrophy of scars that may not be obvious at social distance of 50cm or greater and may be covered easily by makeup or the normal shadow of shaved beard hair of men or normal body hair if extra facial.
3	Moderate	Moderate atrophic or hypertrophic scarring that is obvious at social distance of 50 cm or greater and is not covered easily by makeup or the normal shadow of shaved beard hair in men or body hair if extra facial, but is still able to be flattened by manual stretching of skin (if atrophic).
4	Severe	Severe atrophic or hypertrophic scarring that is evident at social distance greater than 50 cm and is not covered easily by makeup or the normal shadow of shaved beard hair in men or body hair if extra facial and not able to be flattened by manual stretching of skin.

Table 2 Goodman's and Baron Quantitative Acne Grading System. [2]

Grade or type		Number of lesions		
		1 (1-10)	2 (11-20)	3 (>20)
A)	Milder scarring (1 point each) Macular erythematous pigmented Mildly atrophic dish- like	1 point	2 points	3 points
B)	Moderate scarring (2points each) Moderately atrophic dish- like Punched out with shallow bases small cars (<5mm) Shallow but broad atrophic areas	2 points	4 points	6 points
C)	Severe scarring (3points each) Punched out with deep but normal bases, small scars (<5mm) Punched out with deep but abnormal bases, small scars(<5mm) Linear or troughed dermal scarring Deep, broad atrophic scars	3 points	6 points	9 points
D)	Hyperplastic Papular scars Keloidal/ hypertrophic scars	2 points Area<5mm 6 points	4 points Area5-20cm 12 points	6 points Area>20cm 18 points

procedures, especially post inflammatory hyperpigmentation in this population group. Autologous PRP prevents any chances of infection like hepatitis B and C and HIV. A study by Fabbrocini G in 2011 demonstrated a reduction in the depth of scars after treating with PRP and micro needling with no side effects in 12 patients.³ Micro-needling is a collagen induction therapy. Micro-needling when combined with autologous platelet rich plasma (PRP) or Vitamin C seems to be a promising treatment option for atrophic acne scars with minimal chances of cross infection.

Present study is designed to compare and evaluate efficacy of Micro-needling with Autologous PRP against Microneedling with Vitamin C in treating atrophic scars.

Methods

Comparison of the efficacy of micro-needling with PRP versus microneedling with vitamin C was carried out over a period of 6 months. After obtaining approval from institutional ethical committee, this study was conducted, comprising of total 28 patients equally divided in to 2 groups each having 14 patients for comparison as shown in **Tables 3**. Study was conducted in a government tertiary care hospital; all the inclusion and exclusion criteria were fulfilled. Total 3 treatment sessions were given for each group with each session being 3 weeks apart. At each session digital photography was done and results were graded on the basis of Goodman's and Baron qualitative and quantitative acne scar grading. Physicians

Table 3 Microneedling with PRP in Groups A & B.

	Group A (n=14)	Group B (n=14)
Age		
18-22	6	5
23-28	8	9
Gender		
Male	4	13
Female	10	11
GBQASG		
3	14	14
4	0	0
Skin Type		
4	13	12
5	1	2

assessment was also done at the end of the treatment.

Microneedling with PRP: Topical anesthetic cream containing lignocaine and prilocaine 2.5% was applied for about 40 minutes under occlusion before the start of procedure. 15 ml of blood was withdrawn in a 20ml syringe through I/V cannula. Equivalent amount of blood transferred into test tubes containing prefilled acid-citrate-dextrose anticoagulation. Centrifugation was done using double spin method. First a soft spin of 1500 rpm for 10 min (soft spin) was given. Plasma containing platelets was separated from red blood cells at the bottom of tube and was collected in separate plain tubes and red blood cells discarded. A second spin of 3900 rpm at 15min (hard spin) was given to get the final platelet rich plasma. It was then applied on face topically and micro-needling with derma pen (containing a set of needles having a depth of maximum 2.5mm) was done in circular motions along longitudinal and transverse directions. New sets of needles were used for every patient.

Microneedling with Vitamin C: Topical anesthetic cream with topical lignocaine and prilocaine 2.5% was applied for 40 minutes under occlusion. Topical vitamin C serum was applied on face, microneedling with derma pen

was used in circular motions along longitudinal and transverse directions.

After both procedures, advice of topical sunscreen (SPF 50+) and sun avoidance was given. At each follow up, patient was reviewed and possible side effects, if any, were taken in account. Digital photography was done at each session. At the end of final session, scars were graded according to the grading system and physicians assessment rated as excellent (improvement of two grades), good (improvement of one grade) and poor (no upgradation).

The data was entered and analyzed using SPSS 20. The significance of outcome was assessed by calculating 'p' value. Value less than 0.5 was considered significant.

Scoring and grading was done using the scoring/grading systems presented in **Tables 1-2**.

Inclusion Criteria

- Patients with grade 2-4 acne scars; classified on basis of Goodman's qualitative scar grading.
- Patients with no active acne lesions.
- Patients with skin color type 3, 4, 5.
- Patients with atrophic scars only.

Exclusion Criteria

- Prior approval by medical ethics committee of hospital.
- Informed consent about procedure, probable side effects.
- Consent and privacy regarding digital photographic evaluation, later assessed by the dermatologist for final evaluation of acne scars.

Results

Total number of patients enrolled in procedure

were 28. All completed follow ups. Female outnumbered male patients. Age group was from 18-28. Only one case of post inflammatory hyperpigmentation noted at the end the final session. Most of the patients complained of only mild erythema following the procedure, which subsided within a day. Three sessions were given, each three weeks apart. Value of $P < 0.05$ was considered significant.

Microneedling with PRP: On evaluation of Goodman's and Baron qualitative scores reduction of two grades was seen in 3 patients (21.42%), reduction of one grade is seen in 9 patients (64.28%) and no reduction in grade seen in 2 patients (14.28%). Paired t-test showed significant improvement ($t=6.5109$, p value <0.0001). Unpaired t test showed significant improvement ($t=6.5109$, P value <0.0001). Decrease in mean Goodman's and Baron quantitative score was from severe acne grade (C) 9 points to moderate scarring category (B) 3 points at final treatment of 3 sessions each 3 weeks apart. Physician's assessment of improvement showed excellent response in 3 patients, good response in 8 patients and poor response in 3 patients.

Microneedling with Vitamin C: Goodman's and Baron qualitative scores showed reduction of 2 grade in 1 case (7.1%), reduction of 1 grade seen in 8 patients (57.14%) and no reduction in grade was seen in 5 cases (35.71%). Paired t-test showed a significant difference ($t=4.3724$, P -value <0.0008). Unpaired t-test showed significant difference ($t=4.3724$, P -value <0.0002). Decrease in mean Goodman's and Baron quantitative score was from severe acne grade (C) 9 points to category (C) severe acne 3 points. Physician's assessment showed an excellent response in 1 case, good response in 7 patients and poor response in 6 patients.

Patients and physicians' assessment was recorded graphically as shown in **Figures 1, 2**.

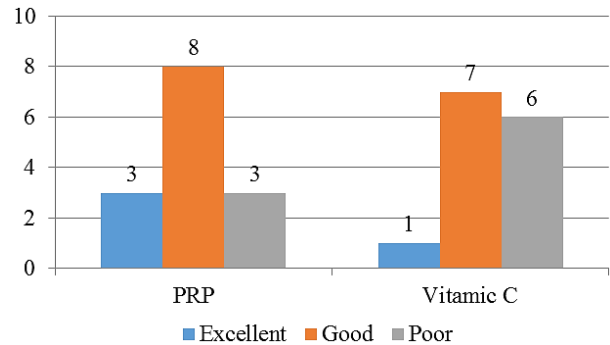


Figure 1 Physicians assessment of acne grade.

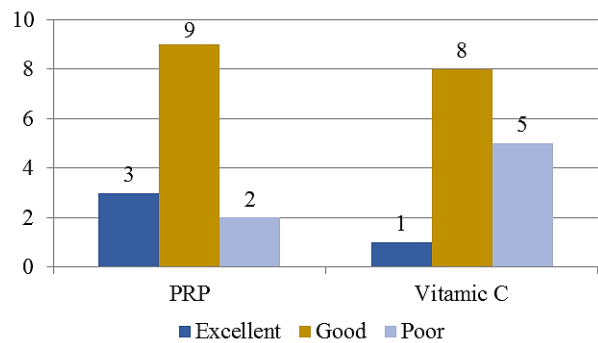


Figure 2 Physicians assessment of acne grade.

Discussion

Micro-needling is an effective procedure with minimal side effects in treating acne scars. It stimulates endogenous collagen production. A study by Majid, Imran in 2009 demonstrated effective results of micro-needling in patients of atrophic acne scars.⁴ Autologous platelet rich plasma of a patient contains high concentration of platelets and several growth factors like transforming growth factors and platelet derived growth factors. These growth factors in the PRP when given along with micro-needling induces collagen synthesis by controlled epithelial injury leading to recruitment of other growth factors and also creates channels for PRP absorption. Micro-needling with vitamin C did not show significant improvement as compared to PRP as illustrated in **Figures 3, 4**. But overall skin firmness and tone was improved.

S. Chawla *et al.*⁵ conducted a study on thirty



Figure 3 Serial photograph of a 26 year old treated with PRP.



Figure 4 Serial photograph of a women age 22 treated with PRP.

patients and also found that PRP combined with micro-needling is better treatment option than micro-needling with vitamin C in treating atrophic scars as seen in a split face study.

Mohd. Asif *et al.*⁶ conducted a study on 50 patients which concluded that micro-needling with PRP is better than micro-needling alone when done with distilled water.

Present study shows that micro-needling with PRP shows significant improveemnt from baseline to final treatment versus micro-needling with vitamin C as shown in **Figures 5, 6.**

Conclusion

Our study showed that micro-needling with PRP appears to be better versus micro-needling with vitamin C for treatment of atrophic acne scars.

Limitations: Fitzpatrick skin type above 4 in this region.



Figure 5 Serial photographs of 23 year old female treated with vitamin C.



Figure 6 Serial photograph of a 25 year old female treated with vitamin C.

Side effects: Post inflammatory hyper pigmentation in 1 case.

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