A Comparative Study of Combined Dermaroller and Platelet-Rich Plasma Versus Dermaroller Alone in Acne Scars and Assessment of Quality of Life Before and After Treatment

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Abstract

Background: Scarring due to acne is a frequently encountered problem in dermatological outpatient department. Microneedling has been a well-accepted modality for the treatment of atrophic acne scars. Platelet-rich plasma (PRP) is a newer option to investigate. Aims: The aims of this study were (1) to compare the efficacy of combined dermaroller and PRP therapy with dermaroller alone in facial acne scars and (2) to assess the psychosocial impact due to acne scars and its treatment. Methods: A total of 55 patients were included in the study and randomly divided into two groups, Group A: 28 and Group B: 27. Proper counseling was done, and detailed clinical findings were recorded. Patients in Group A were treated with dermaroller alone while Group B patients underwent treatment with a combination of dermaroller and intradermal PRP injections. A total of three sitting were done at monthly interval. Final response was assessed at 1 month after the last sitting. Criteria of evaluation included Goodman and Baron's quantitative scale, visual analog score, and dermatology life quality index scores. Side effects were noted. Results were analyzed using Chi-square test and t-test. Results: Significant percentage improvement was noted in both the groups. However, Group B treated with both modalities had better results when compared with that in the Group A. Conclusion: A combination approach using dermaroller and PRP was a safe and better option than using dermaroller alone in atrophic acne scars for clinical improvement as well as for improvement in dermatology life quality index score.

Key Words: Atrophic acne scars, dermaroller, platelet-rich plasma, psychosocial impact

Introduction

Acne vulgaris is a common dermatological disorder among adolescents and often it leads to atrophic scars.[1-3] Layton et al. reported that facial scarring affects both sexes equally and occurs in 90% of patients with acne.[4] Severe postacne scarring has been implicated as a cause of considerable psychological distress, mainly among adolescents.[5-7] Although many treatment options are available, platelet-rich plasma (PRP) is one of the promising therapies for acne scars. PRP has been a long-known tool in esthetic medicine[8-12] although very few of the studies specifically attest to benefits in face and neck revitalization. The present study compared the efficacy of the combination of dermaroller with PRP versus dermaroller alone in patients with atrophic acne scars. Furthermore, the change in quality of life (QoL) of patients after the treatment had been assessed in the study.

Methods

After taking clearance from the Institutional Ethics Committee, 55 patients with acne scars attending the outpatient department were enrolled in the study. The duration of the study was 1 year. The inclusion criteria included age group 18–40 years and cases with atrophic acne scars (Grade 2–4) according to Goodman and Baron's classification system.[13] The exclusion criteria included active acne, history of keloid, bleeding disorder,
lignocaine hypersensitivity, immunocompromised status, and unrealistically high expectations. A proper informed consent was taken and baseline investigations were done. Patients were randomly divided into two Groups: Group A was treated with dermaroller alone while Group B was subjected to a combination therapy of dermaroller and PRP. After gentle cleansing, the area of interest was anesthetized using a thick application of topical anesthetic cream under occlusion for about 30–45 min. For the preparation of PRP, a volume of 20 ml of whole blood was collected and separated into two sterile conical test tubes of 10 ml each containing acid-citrate dextrose and subjected to first centrifugation at 1200 rpm for 15 min. Three layers were formed in each tube, that is, plasma, buffy coat, and red cell sediments. After discarding red cell sediments, the remaining solution was allowed for further centrifugation at 2000 rpm for 10 min, which resulted in the dense layer of platelet at the bottom and clear fluid layer on the top. Most of the clear fluid (platelet-poor plasma) was removed, leaving behind small solution which was PRP. Skin needling was carried out using a dermaroller studded with 192 microneedles in eight rows and 1.5 mm in length.

After gentle cleansing of the face with antiseptic, prepared volume (3–4 ml) of PRP was injected intradermally on the treated area using insulin syringe, and dermaroller was applied sequentially in horizontal, vertical, and diagonal directions till pinpoint bleeding occurred. The face was cleaned with normal saline at the end, and ice compresses were applied. The patients were advised strict photoprotection, topical 20% vitamin C serum to be applied daily and oral antibiotics, if necessary. They were reviewed after 1 week for any side effects and subsequently followed up at 1 month.

Acne scars were classified on the basis of Goodman and Baron's quantitative global acne scar grading system.\textsuperscript{[13]} Scar type, degree of scarring, and number of lesions on both sides of the face were noted. Visual analog score (VAS) was interpreted based on a questionnaire given to the patients where they had to rate their improvement on a 0–10 scale. Score of 0 was taken as “No response,” 1–3 as “Poor response,” 4–5 as “Fair response,” 6–7 as “Good response,” and 8–10 as “Excellent response.” Furthermore, dermatology life quality index (DLQI)\textsuperscript{[14]} score was tabulated.

All the scores were calculated at baseline and at 1 month after the final session. Under adequate illumination, clinical photographs of the full face and both sides of the face were taken before each session and at follow-up.

After collecting the information, data were compiled, tabulated, and analyzed with respect to mean, standard deviation, and percentage. Chi-square test and t-test were applied. \(P<0.05\) was considered statistically significant.

**Results**

At the start of the study, Group A had 28 patients and Group B had 27 patients. Their demographic profile are given in Table 1. Of the total 55 patients enrolled in
the study, 52 patients had completed the study. Two patients were lost to follow-up from Group A. There was one dropout from Group B. There were 24 males and 31 females with mean age of 26.01±3.6. Of the Fitzpatrick skin types, 30 patients (54.55%) belonged to Type IV followed by 19 (34.55%) in Type V and 6 (10.90%) to Type III. The most common scar type noted was a combination of ice pick, boxcar, and rolling scars, in 26 patients (47.27%) followed by combination of ice pick and boxcar scars (29.09%), boxcar and rolling scars (12.73%), ice pick and rolling scars (7.27%), and rolling scars (3.64%). Family history of scarring was positive in 20 patients (36.36%) and negative in the remaining (63.64%). Demographic data are summarized in Table 1.

On calculating Goodman and Baron’s quantitative scores, a statistically significant difference was noted between the two groups after the treatment ($P<0.05$). There

| Table 2: Goodman and Baron’s quantitative scores at baseline and after treatment |
|---------------------------------|---------------------------------|----------------|----------------|
| Group A (Mean±SD)               | Group B (Mean±SD)               | t-score        | $P$            |
| At baseline                     | 43.69±6.45                     | 44.38±6.59     | 0.3815         | 0.7044         |
| At 1 month after the third session | 23.58±5.71                     | 18.58±4.12     | 3.6208         | <0.05          |
| Paired $t$ test                 | $T$ score=64.79                | $T$ score=37.36 | $P<0.01$       | $P<0.01$       |
was 58.58% improvement in acne scars in Group B and 43.03% in Group A [Table 2 and Figures 1a, 1b, 2a, 2b].

On visual analogue score, there was greater improvement in Group B after the treatment indicating greater patient satisfaction in the group treated with the combination therapy [Table 3].

On tabulating DLQI scores, baseline figures of both the groups indicated that acne scars had very large to extremely large effect on patients’ quality of life. After treatment, a statistically significant difference was noted between the two Groups. There was 58.47% improvement in QoL in Group B and 42.67% in Group A [Table 4].

Few side effects were noted. Erythema (19.23%), edema (28.85%), and hyperpigmentation (5.77%) were the side effects reported. There was no statistically significant difference in the occurrence of side effects between the two groups [Figures 3 and 4a, b].

**Discussion**

Treatment of acne scars often involves a concoction of approaches. With the advent of microneedling and PRP therapy for atrophic scars, new avenues for treatment of acne scars can be explored. Microneedling, which is done using dermaroller, is an efficacious procedure with less side effects. This procedure, in addition to collagen induction, creates minute inlets for effective absorption of topical agents.[15] PRP serves as rich 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 the wound-healing response.[16,17] In a split face study by Fabbrocini et al.,[16] severity score analysis showed that acne scars on the right side of patients’ faces, treated with skin needling in combination with PRP application, had higher improvement than the ones on the left side, treated with skin needling alone.[16] Nofal et al. studied 45 patients with acne scars and reported that patients treated with a combination of skin needling and PRP showed statistically highly significant improvement in the degree of acne scars.[18]

In our study females outnumbered males (56.36:46.64); Goulden et al. observed scarring more in male in their study.[19] Probably males in our country are less conscious about cosmesis and ask for help less in number. Mean age of patients was 26.37 years in our study sample and maximum numbers (65.38%) were between the age group of 25–30 years of age. Majid observed age of the patients ranged from 13 to 34 years, with the mean age of 22.4 years.[20]

We observed most of our patients were suffering from combination of ice pick, boxcar, and rolling scars (47.27%) followed by a combination of ice pick and boxcar scars. Jacob et al. observed that ice pick type represents 60%–70% of total scars, the box scars 20%–30%, and rolling scars 15%–25%.[21]

We had used Goodman and Baron’s quantitative acne scar grading system[13] of classification for acne scars. The grading system was based on lesion counting (1 point for a number of lesions <10, 2 points between 11 and 20,
and 3 points >20) and severity (1 point for mild atrophic scarring, 2 points for moderate atrophic scarring, 3 points for severe atrophic scarring, and 4 points for hyperplastic scarring). The lesion counting score was then multiplied for the lesion severity score. The final score depended on the addition of points assigned to each respective category and reflected disease severity, ranging from a minimum of 0 to a maximum of 84. Although complicated, it helped us in objective assessment in a systematic way. In a study by Chandrashekar et al., quantitative assessment using Goodman and Baron’s score showed moderate improvement in 58% of the patients, minimal in 29%, good improvement in 9%, and very good improvement in 3% of the patients. Our study showed 59% improvement among Group B and 43% improvement among Group A patients using this scoring system.

Furthermore, the change in the QoL of patients after taking treatment had been assessed in the study using DLQI. The questionnaire was designed for use in adults, i.e., patients over the age of 16. It was self-explanatory and could be simply handed to the patient who was asked to fill it in without the need for detailed explanation. It was usually completed in 1 to 2 min. The score was calculated by summing the score of each question resulting in a maximum of 30 and a minimum of 0. The higher the score, the more QoL was impaired.

Meaning of DLQI Scores:
- 0–1 = No effect at all on patient’s life
- 2–5 = Small effect on patient’s life
- 6–10 = Moderate effect on patient’s life
- 11–20 = Very large effect on patient’s life
- 21–30 = Extremely large effect on patient’s life.

The DLQI scores clearly indicated that both the groups were benefitted in terms of improvement in quality of their life. However, the patients treated with both dermaroller and PRP had statistically significant results. Hayashi et al. observed acne scars in 90.8% cases and opined that acne scars had a negative impact on patient’s QoL. In an Indian study conducted by Hazarika and Rajaprabha, 13 out of 29 cases with severe acne scars had DLQI scores, interpreted as very large effect.

The side effects noted were few and there was not much difference between the two groups in occurrence of side effects. Erythema and edema occurred after the procedure and persisted for 3–4 days while patients reported hyperpigmentation at 2-3 weeks after the sitting. In the study by Garg and Baveja, three patients (6%) developed postinflammatory hyperpigmentation.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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