

Comparison of Micro Needling plus Topical Insulin with Micro Needling Alone In Patients with Atrophic Acne Scars: A Split Face Study

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ABSTRACT

Objective: To study the efficacy of topical Insulin with microneedling compared to microneedling alone in atrophic acne scars.

Study Design: Prospective, split face, comparative study.

Place and Duration of Study: Department of Dermatology, Combined Military Hospital, Gujranwala Pakistan, from Jan to Jul 2021.

Methodology: Fifty patients with atrophic acne scars from the dermatology outpatient department were selected. The right half of the face was treated with microneedling with Dermapen, keeping the needle depth at 2 mm, along with 40 units of Insulin, while the left half was treated with microneedling alone. The sessions were repeated at monthly intervals for a total of 3 sessions. Goodman and Baron's quantitative scar scale was assessed at the beginning and then one month after the last (3rd) session, and improvement was measured.

Results: Pre-treatment Goodman and Barons quantitative score mean on the right half was 20.44 ± 3.54 whereas on the left half was 20.62 ± 3.23 . Post-procedure Goodman and Baron's quantitative grading scale mean score on the right half was 9.78 ± 2.88 while on the left half, 10.54 ± 2.27 . The improvement in mean global scores on the right and left halves was 10.66 ± 2.11 and 10.08 ± 1.88 , respectively. The paired sample t-test showed a significant difference ($p < 0.001$) in the scores of both the right and the left halves.

Conclusion: Microneedling alone and combined with Insulin effectively treats atrophic acne scars.

Keywords: Atrophic acne scars, Goodman and baron's quantitative scar scale, Micro-needling, Topical insulin,

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INTRODUCTION

Acne vulgaris is one of the most common diseases encountered in dermatology OPD in adolescents. More than 90% of adults suffer from acne on their face, back, or chest.¹ Post-acne scarring is one of the most common aesthetic concerns patients seek dermatological advice for. These patients have a significantly lower DLQI.² Acne scars are broadly classified into hypertrophic (keloid) and atrophic scars (ice pick, boxcar, and rolling scars). Almost 80% of patients have mild to moderate scarring, followed by 50% having severe disfiguring scars.³

Atrophic acne scars are caused by the breakdown of collagen and elastic fibres, the release of inflammatory mediators, and the activation of enzymes.⁴ Multiple treatment modalities, including chemical peels, dermabrasion, lasers, fillers and surgical excision, have been tried for the treatment of atrophic scars. Delineating a single best treatment

modality for acne scars has not yet been validated, with different studies showing different efficacy of various treatment options.⁵

Microneedling has become an important treatment modality in treating atrophic acne scars. It stimulates collagen due to minute injury to the dermis with microneedles, leading to endothelial stimulation and neoangiogenesis. This process continues tissue remodelling for eight weeks to 1 year, thus providing continuing scar improvement.⁶ Topical Insulin stimulates collagen production in skin fibroblasts and increases keratinocyte differentiation, migration and proliferation during re-epithelialization.⁷ These effects are mediated through an Insulin receptor-dependent but EGF/EGF-R nondependent pathway. Topical Insulin application leads to increased synthesis as well as the maturation of collagen fibres, especially type III collagen in a basket weave pattern, which is found in the normal skin as compared to a crisscross pattern of collagen commonly found in the scars.⁸

Atrophic acne scars are very commonly consulted as a reason for seeking dermatological care in

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outpatient clinics for treatment. Treatment modalities presently cited in literature regarding the use of microneedling are scarce. In addition, topical Insulin and microneedling are the most recently advocated treatment options.⁹ The objective of the present study was to explore the efficacy of topical Insulin with microneedling in comparison to microneedling alone in atrophic acne scars. This study is the first of its kind in our region to document effective treatment modalities in the skin of colour.

METHODOLOGY

The prospective, split face, comparative study was conducted at the Outpatient Dermatology Department Combined Military Hospital, Gujranwala Pakistan, from January to July 2021 after Hospital Ethical Committee approval (ERB 001/2022). The sample size was calculated using the WHO sample size calculator with an acne scar prevalence of 1%.¹ Patients were selected using a consecutive sampling technique.

Inclusion Criteria: Patients of either gender, aged 18-50 years with atrophic acne scars with a quantitative score of ≥ 30 , calculated from both halves of the face (calculated based on Goodman and Baron’s quantitative global scarring grading system), were included.

Exclusion Criteria: Patients with active acne, a history of any underlying bleeding or platelet disorders, having a keloidal tendency, a history of retinoid use in the past three months or previous treatment with microneedling/dermaroller/ fractional CO₂ laser, pregnancy, lactation were excluded.

The patients were provided informed written consent, and the procedure was explained in detail. Each patient’s case record form was filled out. At the baseline, complete blood counts, bleeding time, clotting time, PT, and APTT were performed.

Topical anaesthesia with 5% Lignocaine, 5% Prilocaine, and 3% Benzocaine Cream was applied for 30 minutes. The cream was then removed, and the skin was cleaned with alcohol.

Microneedling was performed with the help of a dermapen (Dr Pen Ultima A1) with a disposable 42-pin microneedle on both sides of the face, keeping the needle depth at 2 mm. 40 units of topical Insulin (Humulin R) were applied on the right half of the face during the procedure of microneedling. In contrast, isolated microneedling was performed on the left half. The face was cleaned with plain water 30 minutes after the procedure, and significant observations about

erythema, oedema and skin peeling were recorded. Post-procedure, gentle emollient and photoprotection were advised. Digital colour photographs were taken at the baseline and one month after the last session. A total of 3 sessions one month apart were performed on each patient. Goodman’s and Baron’s quantitative scar scale (Table-I) was used at the beginning and one month after the third session.

Table-I: Goodman and Baron’s Quantitative Global Scarring Grading System

(Grade) Type	Number of lesions: 1(1-10)	Number of lesions: 2 (11-20)	Number of lesions: 3 (>20)
(A) Milder Scarring (1 Point Each)	1 point	2 points	3 points
Macular Erythematous or Pigmented			
Mildly Atrophic Dish-like			
(B) Moderate Scarring (2 Points Each)	2 points	4 points	6 points
Moderately atrophic dish-like			
Punched out with Shallow Bases Small scars (< 5 mm)			
Shallow but Broad Atrophic Areas			
(C) Severe Scarring (3 Points Each)	3 points	6 points	9 points
Punched out with Deep But Normal Bases, Small Scars (< 5 mm)			
Punched out with deep Abnormal Bases, Small scars (< 5 mm)			
Linear or Troughed Dermal Scarring			
Deep, Broad Atrophic Areas			
(D) Hyperplastic Papular Scars	2 points	4 points	6 points
(D) Hyperplastic	Area <5cm ²	Area 5-20 cm ²	Area >20 cm ²
	6 points	12 points	18 points
Keloidal/Hypertrophic scars			

Statistical Package for Social Sciences (SPSS) version 25.0 was used for the data analysis. Quantitative variables were expressed as Mean \pm SD and qualitative variables were expressed as frequency and percentages. Subjective Patient satisfaction was documented for each half of the face in the fourth

month and categorized as 0 (no response), 1-4 (poor response), 5-7 (good response), and 8-10 (excellent response). The scores of both halves of the face were tested using a paired sample t-test. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 50 patients participated in our study. Their age ranged from 18 to 48 years, with a mean age of 27.94±5.06 years. Males were 29(58%), and females were 21(42%). Skin type of patients as per Fitzpatrick classification is listed in Table-II.

Table-II: Skin Type of Patients as Per Fitzpatrick Classification (n=50)

Fitzpatrick Skin Type	Patient Skin Type n (%)
II	3(6%)
III	22(44%)
IV	25(50%)

Pretreatment Goodman’s and Baron’s quantitative score means on the right half was 20.44±3.54 whereas on the left half was 20.62±3.23. Post-procedure Goodman and Baron quantitative grading scale mean score on the right half was 9.78±2.88 while on the left half, 10.54±2.27. The improvement in mean global scores on the right and left halves was 10.66±2.11 and 10.08±1.88, respectively. The paired sample t-test showed a significant difference (*p*<0.001) in the scores of both the right and the left halves. Subjective patient satisfaction scores had a mean value of 6.04±1.70 on the right and 5.56±1.61 on the left (*p*<0.001), which was significant on both sides (Table-III).

Table-III: Post Procedure Parameters of Patients (n=50)

Post Procedure Parameters	Right Half Mean±SD	Left Half Mean±SD	<i>p</i> - value
Peeling	7.04±0.75	8.14±1.01	0.103
Erythema	1.82±0.62	2.92±1.08	0.009
Swelling	1.38±0.53	1.56±0.61	<0.001

DISCUSSION

Post-acne atrophic scars are one of the most common conditions for which adolescents seek dermatological care in outpatient clinics. Many commonly used minimally invasive treatment modalities are common practice, but a single effective and definitive solution for treating acne scars needs to be included. The same patient’s various morphological types of atrophic acne scars respond differently to various treatment options. In addition, the overall appearance, as well as the patient’s expectations and satisfaction,

make it difficult to assess the efficacy of any therapeutic option.¹⁰

In this study, more male patients 29(58%) sought advice regarding acne scars than female patients 21(42%). This was in concordance with the studies done by Layton *et al.*¹¹ and Fernandes *et al.*¹² (both studies showing 70% males vs 30% females) and also by Hou *et al.*¹³ in Chinese individuals, which included 64.51% males as compared to 35.48% females. All these studies show a prevalence of acne scars in males since the male gender is an independent risk factor for acne scarring.¹⁴

An individual dermatologist subjectively scored the study participants on the basis of Goodman’s quantitative scale, both pre-and post-treatment sessions, to rule out individual bias. A split-face trial of the same individual was done to rule out patient variations and changes in different skin types’ healing and regenerating capacities based on age, gender, and environmental circumstances (Figure).



Figure: Pre and Post Microneedling

In this study, microneedling significantly reduced the appearance of atrophic acne scars, whether given alone or in combination with Insulin. Similar results were noticed in a study by Qian *et al.*¹⁵ compared micro needling with PRP to microneedling alone, and both groups showed significant improvement (*p* value <0.001). Ibrahim *et al.*¹⁶ observed a 45% response on microneedling with topical Insulin versus a 26% response on microneedling with PRP in a split face trial on the Indian population. However, ice pick and boxcar scars responded better to topical Insulin therapy.

This study showed that the side treated with Insulin experienced early healing regarding the erythema, swelling and skin peeling. Lee *et al.* performed one such study with PRP, showing that the side treated with PRP had early resolution of minor

post-procedure side effects.¹⁷ We could not find any such study combined with Insulin that reports early healing and reduced downtime post-procedure. We can infer from our study that Insulin, by increasing tissue repair, helps in early and enhanced healing post microneedling.

Microneedling has also been compared with other treatment modalities for atrophic acne scars, including subcision and TCA CROSS. Hassan *et al.* demonstrated efficacy in 77% of patients treated with microneedling alone compared to 100% in microneedling and subcision combination.¹⁸ Sharad *et al.* evaluated the effects of microneedling combined with glycolic acid versus microneedling alone, showing a greater decrease in acne scarring score in the combination group than in microneedling alone (62% vs 33%).¹⁹ Hence, combination treatments with microneedling lead to a better outcome in atrophic acne scars.

Post-procedure patient satisfaction grades showed significant improvement on both sides of the face.

We propose that microneedling is efficacious in treating atrophic acne scars because it stimulates the skin to produce more collagen. When combined with Insulin, it helps in early skin healing and regeneration, hence improving acne scarring and reducing the side effects of post-inflammatory pigmentation, erythema, swelling, and skin peeling.

LIMITATION OF STUDY

Limitations of our study include a small sample size, shorter duration of follow-up, and non-blinding of patients, which might have influenced the different satisfaction scores on the two halves of the face. The procedure was done by dermatologists; differences in dominant hand and pressure may influence the result. Various acne scar morphologies were not individually described regarding individual treatment responses.

CONCLUSION

Our study emphasized good and comparable results for microneedling with topical Insulin and microneedling alone. However, the skin healing time was shorter, and side effects were better tolerated in the microneedling with the topical Insulin group.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SM & MT: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

QE & KK: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SK & SS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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