

Comparison of Effectiveness of Platelet Rich Plasma (PRP) versus 30% Trichloroacetic Acid (TCA) in the Treatment of Acne Scars

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ABSTRACT

Objective: To compare the effectiveness of intradermal platelet-rich plasma with 30% Trichloroacetic acid in treating atrophic acne scars.

Study Design: Quasi-experimental study.

Place and Duration of Study: Tertiary Care Hospital of Multan Pakistan, from Aug 2019 to Sep 2020.

Methodology: A total of 76 patients (38 in each group), were enrolled in the study. Platelet-rich plasma treatment was given to Group-A, and 30% Trichloroacetic acid treatment was given to Group-B patients. Platelet-rich plasma was injected in the dermis with an insulin syringe while 30% Trichloroacetic acid was applied with a cotton tip applicator. The effectiveness of treatment was measured by Goodman and Baron quantitative acne scar scale.

Results: A total of 76 patients with atrophic acne scars were included in the study. The mean age of patients in Plate rich plasma Group was 29.63±5.08 years and 29.92±5.85 years in the 30% Trichloroacetic acid Group. Platelet Rich Plasma was an effective treatment of atrophic acne scar ($p= 0.030$) with post-procedure improvement in the Goodman and Baron quantitative acne scar scale.

Conclusion: Atrophic acne scar treatment with intradermal Plate-rich plasma is more effective than 30% Trichloroacetic acid.

Keywords: Acne scars, Effectiveness, Platelet-rich plasma (PRP), Trichloroacetic acid.

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INTRODUCTION

Acne is a chronic inflammatory disease of pilosebaceous units that affects 80% of adolescents.¹ Commonly affected sites are the chest, back and face. Acne scars are the sequel of acne and negatively influence the quality of life. The severity and prevalence of acne scarring are mainly unknown in the population. Acne scars are subdivided into three main categories: keloids, hypertrophic and atrophic. Atrophic scars are more common and classified as box scars, rolling and ice pick.² The prevalence in the general population of acne scars is 1%.³

The basic pathophysiology of acne scars is multifactorial. It results from an altered healing response to chronic inflammation. Acne scars presents treatment challenges to dermatologists.⁴ They are assessed clinically by validated tools. These scales include the observer scar scale, Goodman and Baron quantitative acne scar scale and Vancouver scar scale.⁵ Acne scars need appropriate evaluation for their treatment. Available treatments are categorized as energy-based treatments and non-energy-based treatments.⁶ The

energybased treatments include bipolar radiofrequency and fractional micro-needling radiofrequency.⁷ Non-energy-based treatments are fractional ablative lasers, Pulse dye lasers, Platelet-rich plasma therapy, chemical peels, micro-needling and derma- abrasions.

Platelet-rich plasma (PRP) is an autologous concentration of human platelets. It has many growth factors that include epidermal growth factor (EGF), platelet-derived growth factors (PDGF), transforming growth factor beta(TGF- β), vascular endothelial growth factors(VEGF), insulin-like growth factor (IGF) and fibroblast growth factor(FGF). Treatment with 35%-100% Trichloroacetic acid (TCA) has been used for acne scars. However, the safety profile was a concern.⁸ Therefore, new treatment modalities such as PRP gained interest. Furthermore, post-inflammatory hyper and hypopigmentation is an undesirable effect on the skin of colour with TCA cross. The present study aims to compare the effectiveness of intra-dermal PRP and 30% TCA in treating atrophic acne scars.

METHODOLOGY

This quasi-experimental study was conducted from August 2019 to September 2020 at the Dermatology Department of the Tertiary Care Hospital of Multan after the approval from the Institutional Ethical

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Review Committee (IERB No.13/Trg/2021). All patients were enrolled after informed consent through consecutive sampling.⁹

Inclusion Criteria: Patients of either gender, aged 16-40 years, with atrophic acne scars of the duration (of scars) less than one year were included in the study.

Exclusion Criteria: Patients with a history of bleeding disorders, e.g. idiopathic thrombocytopenic purpura, connective tissue disorders, collagen vascular diseases, active acne and infections like herpes simplex, impetigo, pustular acne, lactating and pregnant women and keloid tendency were excluded from the study.

Written informed consent was also taken from each patient. The patients' history regarding age, gender, type and grading of atrophic scar based on Goodman and Baron's quantitative grading scale were noted. This scale grades atrophic scars of acne as mild for macular pigmented and slight atrophic scars, moderated for a moderate atrophic dish-like, small punched-out scars but atrophic areas (< 5mm), severe atrophic as punched out with deep bases that may or may not be normal, linear or troughed scars.¹⁰ Patients were explained the procedure of PRP and 30% TCA application. Patients in Group-A were asked to apply 5% Topical Lidocaine anaesthetic cream for 25 minutes. Platelet-rich plasma was prepared in a centrifuge machine in two steps. First step patients 18ml of blood was drawn in a tube containing Sodium citrate as an anticoagulant. It was centrifuged at 1500 rpm for 3min (soft spin). This separated blood into red cell concentrates in the bottom, buffy coat in the middle and plasma at the top. Plasma was then transferred to another plain tube and centrifuged a second time at 3000rpm for 5min (hard spin). An insulin syringe collected the platelet pellet formed at the bottom of the tube. The skin of the patient with the atrophic scar was cleaned with an alcohol spirit swab, and intradermal 0.1ml of PRP was injected into the base of the atrophic scars of Group-A patients. A superficial bleb was formed. The skin was then gently massaged. Bleeding points at injection sites were cleaned. Thirty percent TCA was applied with a cotton applicator to atrophic acne scars in Group-B. Endpoint was a superficial white frost. Frost was then neutralized with distilled water. Treatment was repeated at four weeks in each Group, and a total of 4 sessions were given to each patient according to treatment response. The outcome was assessed at 4 and 16 weeks based on Goodman and Baron's scale grading.

Statistical Package for Social Sciences (SPSS) version 23.0 was used for the data analysis. Quantitative variables were summarized as Mean±SD and qualitative variables were summarized as frequency and percentages. The chi-square test was used to compare the effectiveness of PRP and 30%TCA in pre and post-treatment Groups. Patient satisfaction with the procedure was recorded on a five-point Likert scale. The independent t-test was applied to grade satisfaction between two Groups at 4 and 16 weeks. The *p*-value ≤0.05 was considered significant.

RESULTS

A total of 76 patients with atrophic acne scars were enrolled, with 38 in each Group. The mean age of patients in Group-A was 29.26±5.08 years and 29.92±4.85 years in Group-B.

Distribution of atrophic scars in Group-A with ice pick was 19(50%), box scars in 8(21.1%), and rolling in 11(28.9%) cases. Group-B had an ice pick in 10(26.3%), box scar in 11(28.9%), and rolling in 17(44.7%). Grading of atrophic acne scars as Goodman and Barons scar scale between PRP and TCA Groups at four weeks (*p*=0.552) and 16 weeks had significant difference (*p*<0.03) (Table-I).

Table-I: Goodman and Barons Atrophic Acne Scar Grade Between Treatment Groups (n=76)

Treatment Groups	Goodman and Barons Atrophic Acne Scar Grade				<i>p</i> -value
	Macular	Mild	Moderate	Severe	
Pretreatment PRP(n=38)	11(28.9%)	10(26.3%)	9(23.7%)	8(21.1%)	0.552
TCA(n=38)	10(26.3%)	14(36.8%)	10(26.3%)	4(10.5%)	
Post treatment PRP (n=38)	20(52.6%)	8(21.1%)	10(26.3%)	-	0.03
30% Trichloroacetic Acid (TCA) (n=38)	10(26.3%)	14(36.8%)	10(26.3%)	4(10.5%)	

In Group-A, four (10.5%) patients were dissatisfied, 1(2.6%) was neutral, 8(21.1%) were satisfied, and 25(65.8%) were strongly satisfied. Whereas in Group-B strongly dissatisfied cases were 13(34.2%), dissatisfied were 7(18.4%), satisfied were 14(36.8%)and strongly satisfied were 4(10.5%).The difference in satisfaction between the two groups was statistically insignificant (*p*=0.916) at week four and week 16(*p*=0.937) (Table-II).

Table-II: Patients Satisfaction Score with Platelet Rich Plasma (PRP) and 30% Trichloroacetic Acid (TCA) (n=76)

Satisfaction	Treatment Groups		<i>p</i> -value
	Platelet Rich Plasma n(38)	30% Trichloroacetic Acid n(38)	
Week-4	4.43±0.97	2.87±1.55	0.916
Week-16	4.37±1.06	2.66±1.53	0.937

Acne scars improve between PRP and 30% TCA as shown in Figure A & B.



Figure-A: PRP Therapy in 4, 8, 12 & 16 Weeks



Figure-B: 30% TCA in 8, 12 & 16 Weeks

DISCUSSION

We compared the effectiveness of PRP and 30% TCA in treating atrophic acne scars. Acne scars are a common condition. However, their evaluation, treatment and recommendation remain challenging for the dermatologist. Atrophic acne scars are well-known and frequently observed. They are a common aesthetic concern.¹¹ There are various therapeutic options, but they are time-consuming and ineffective at times.¹² The primary concerns for losing patients on long-term follow-up are the longer duration of treatment and the delayed response to medication.¹³ While using PRP for skin rejuvenation, Redaelli *et al.*¹⁴ noticed that intradermal PRP injection improved acne scars. They were the first to advocate for more research into the benefits of PRP injections in acne scars. PRP injection immediately after the carbon dioxide laser resurfaces, according to Lee *et al.*¹⁵ enhances the recovery of laser-damaged skin and improves the clinical appearance of acne scars synergistically.

Platelet-rich plasma therapy is a promising non-surgical aesthetic modality; however, larger, well-

controlled studies with longer follow-up periods are needed to determine its efficacy as a biostimulator and confirm its long-term effects¹⁶. In our study, the PRP had significantly better results than 30% TCA. Mumtaz *et al.*⁸ in Pakistan compared intradermal PRP with 50% TCA cross in 92 cases of atrophic acne scars, with 46 cases in each group. They found PRP significantly ($p < 0.001$) better treatment than 50% TCA. These results match the results of our study. Nofal *et al.*⁹ in a study, compared the effectiveness of PRP in the treatment of atrophic acne scars with TCA, but they used a 100% concentration of TCA. They also find in their study that PRP is better than 100% TCA. Again, these results are in line with our results. Kaur *et al.*¹⁷ conducted another research in which they analyzed numerous outcomes in patients treated with 50 percent TCA utilizing the CROSS method. They discovered that scar grading improved in all of the patients.

Platelet-rich plasma release many growth factors, chemokine and cytokines, including the growth factors from vascular endothelium, platelet-derived growth factors, epidermal growth factor, fibroblast growth factor, and transforming growth factor-B.¹⁸ Platelet-rich plasma therapy has many clinical benefits in tissue regeneration.¹⁹ It is now promising safe and efficient therapeutic intervention in aesthetics.²⁰

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LIMITATION OF THE STUDY

In both good and slow responders, treatment might have been continued longer to achieve greater effectiveness. In addition, no post-procedure pigmentary changes were recorded.

CONCLUSION

Atrophic acne scars treatment with intradermal platelet-rich plasma is more effective compared to 30% Trichloroacetic acid.

Conflict of Interest: None.

Author's Contribution

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

MJ & MT: Conception, data acquisition, drafting the manuscript, approval of the final version to be published, SH & MS: Study design, data analysis, critical review, drafting the manuscript, critical review, approval of the final version to be published.

TS & FA: Critical review, data interpretation, 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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