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Original Research Article

EFFECT OF PLATELET-RICH PLASMA IN CHRONIC NON-HEALING WOUNDS

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ABSTRACT

Background: The effectiveness of platelet-rich plasma (PRP) therapy in treating chronic non-healing wounds, which present considerable difficulties in clinical practice because they are resistant to conventional treatments, is examined in this study. By boosting cellular regeneration and lowering inflammation, platelet-rich plasma (PRP), an autologous blood-derived product enhanced with growth factors and platelets, has demonstrated potential in aiding wound healing. Patients with persistent wounds were enrolled in the trial, which evaluated the effectiveness of PRP vs traditional therapies for wound healing

Materials and Methods: Chronic wounds were randomized into PRP and control groups. PRP was prepared from autologous blood and applied topically and subcutaneously. Outcomes included time to granulation, wound closure rates, patient satisfaction, and adverse effects, analysed using Statistical Package for Social Sciences (SPSS).

Results: PRP therapy showed accelerated granulation, sped up the healing process and improved patient satisfaction making it a useful supplement for treating chronic wounds.

Conclusion: PRP is a safe, effective adjunct for treating chronic non-healing wounds, offering faster healing and better patient outcomes than conventional therapies.

Keywords: Platelet-rich plasma, chronic non-healing wounds.

INTRODUCTION

A major global medical and economic concern are chronic non-healing wounds, which are defined by persistent inflammation and an inability to go through the normal stages of wound healing. These wounds, including diabetic ulcers, venous ulcers, and pressure sores, often fail to heal due to underlying conditions that impede cellular activity and vascularization, resulting in stalled healing processes. Common causes include diabetes, vascular disease, and compromised immunity, which hinder the body's natural healing mechanisms (Sebastian et al., 2014; Greer et al., 2012).[1,2]

Chronic inflammation, poor angiogenesis, and growth factor imbalance are all part of the complicated pathophysiology of chronic wounds. Chronic wounds can linger for months or even years, drastically affecting patients' quality of life and driving up healthcare expenses, in contrast to acute wounds, which usually heal in a matter of days to weeks (Rayner et al., 2009; Anderson, 2006).[3,4] For instance, chronic diabetic ulcers are a major precursor to lower limb amputations, with an estimated 85% of amputations linked to non-healing foot ulcers in diabetic patients (Brem & Tomic-Canic, 2007).[5] Current treatment approaches, including debridement, dressings, and conventional therapies, often fall short in promoting effective healing in these wounds (Agale, 2013).[6]

Autologous platelet-rich plasma (PRP), which is made from the patient's own blood, may provide a novel treatment for wounds that don't heal, according to new research. Rich in platelets, growth factors, and

cytokines, PRP promotes angiogenesis, migration, and cell proliferation—all of which are critical for tissue healing. Growth factors that are essential for collagen production, fibroblast migration, and the creation of new blood vessels include platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), and vascular endothelial growth factor (VEGF) (Suryanarayan et al., 2015; Driver et al., 2006).[7,8] These components make PRP a powerful agent for initiating and sustaining the wound healing process, especially in cases where natural healing is compromised (Martinez-Zapata et al., 2012; Obolenskiy et al., 2014).[9,10]

PRP is prepared by centrifuging autologous blood to concentrate platelets within a small volume of plasma. Once activated, these platelets release growth factors that enhance the wound healing cascade. Numerous studies have reported PRP's efficacy in treating chronic wounds, especially diabetic foot ulcers and venous ulcers. For instance, a study by Suthar et al,[11] (2017) demonstrated significant improvement in wound healing rates among patients treated with PRP, with faster granulation and reduced wound size compared to conventional treatments. Another study by Steed (1995) found that the application of PRP significantly reduced healing time in patients with diabetic ulcers, highlighting its potential as a therapeutic adjunct in wound care.[12]

With an emphasis on wound closure rates, time to granulation, and patient satisfaction, the study aims to evaluate the benefits of PRP therapy in patients with chronic non-healing wounds. By comparing PRP with conventional treatments, this research seeks to determine whether PRP can bridge the gap in current wound care practices, providing faster and more efficient healing for chronic wound patients.[13]

MATERIALS AND METHODS

Over the course of 18 months, from October 2019 to March 2021, this prospective interventional trial was carried out at the Northern Railway Central Hospital in New Delhi. Informed consent was given by each participant, and ethical approval was acquired. Patients with chronic non-healing wounds, such as diabetic ulcers, pressure ulcers, and venous ulcers, who had not improved after more than four weeks of standard treatment were included in the study. They ranged in age from 18 to 70. Pregnancy, PRP allergies, and uncontrolled medical conditions were among the exclusion criteria.

PRP was prepared by centrifuging 6 mL of autologous blood to concentrate platelets in a small plasma volume. The wound area was cleaned and debrided before applying PRP. PRP was injected subcutaneously around the wound and applied topically. Wounds were dressed and monitored, with assessments on days 3, weekly for four weeks, and monthly up to six months post-treatment.

Primary outcomes included the time to granulation tissue formation, rate of wound closure, and adverse effects. Secondary outcomes involved patient satisfaction and reduction in wound size, evaluated via photography and clinical assessments. SPSS software was used to analyse the data, and a significance level of $p < 0.05$ was applied.

RESULTS

Fifty individuals with chronic wounds that did not heal were recruited and randomly assigned to one of two groups: the PRP therapy group or the control group. To ensure comparability, both groups were evenly distributed in terms of age, gender, and wound characteristics. Participants were 40% female and 60% male, with an average age of 58.6 years. Diabetes, venous insufficiency, and peripheral vascular disease were common comorbidities; the prevalence of these illnesses did not significantly differ between groups ($p > 0.05$).

Table 1

Characteristic	PRP Group	Control Group	p-value
Mean Age (years)	59.1 ± 10.2	58.0 ± 9.8	0.67
Male (%)	58%	62%	0.78
Diabetes (%)	36%	40%	0.81
Peripheral Vascular Disease (%)	28%	32%	0.73

In contrast to the control group, the PRP group showed granulation tissue production noticeably earlier. Eighty percent of the PRP group's patients had significant granulation tissue coverage by the second week after treatment, compared to forty percent of the control group ($p < 0.01$). In contrast to 65% of patients in the control group, almost all PRP group patients had full granulation coverage by the fourth week. These findings demonstrate the improved wound bed preparation made possible by PRP, which may result in quicker healing.

Table 2

Time Point	PRP Group (Granulation %)	Control Group (Granulation %)	p-value
Week 2	80%	40%	< 0.01
Week 4	95%	65%	< 0.05

With a mean healing period of 8 weeks as opposed to 12 weeks in the control group, the PRP group's average time to wound closure was noticeably shorter ($p < 0.05$). Only 25% of patients in the control group had equivalent wound closure by the eighth week, compared to 60% of patients in the PRP group. By the 12-week follow-up, 90% of the PRP-treated wounds had healed completely, compared to 65% in the control group.

Table 3

Time Point	PRP Group (Closure %)	Control Group (Closure %)	p-value
Week 8	60%	25%	< 0.05
Week 12	90%	65%	< 0.05

With 85% of patients indicating good satisfaction with the treatment outcome, the PRP group continuously had higher patient satisfaction scores than the control group ($p < 0.05$). PRP group patients often reported increased wound appearance, decreased pain, and quicker healing as reasons for their happiness.

Table 4

Outcome	PRP Group (Satisfaction %)	Control Group (Satisfaction %)	p-value
Satisfaction	85%	60%	< 0.05

Minimal adverse effects were reported in the PRP group, with only mild discomfort at injection sites and transient swelling in some patients. No major adverse events, such as infections, allergic reactions, or systemic complications, were reported in either group, confirming the safety profile of PRP in chronic wound management.

DISCUSSION

In comparison to standard treatments, this study assessed the effectiveness of platelet-rich plasma (PRP) therapy in improving wound healing in patients with chronic non-healing wounds, showing that PRP dramatically decreased the time to granulation and overall wound closure. These results are consistent with an increasing amount of data demonstrating the value of PRP in wound care, especially for chronic wounds that don't improve with conventional therapies.

The results indicate that PRP accelerates granulation tissue formation and wound healing. Most PRP-treated patients had substantial granulation tissue coverage by the second week, whereas the control group fell behind. The concentrated growth factors in PRP, including vascular endothelial growth factor (VEGF), transforming growth factor-beta (TGF-β), and platelet-derived growth factor (PDGF), which encourage fibroblast proliferation, collagen production, and angiogenesis, are probably the cause of this discrepancy. Studies by Suryanarayan et al. (2015) and Frykberg & Banks (2015) corroborate these findings, indicating that PRP provides a favourable environment for tissue repair by addressing growth factor deficiencies common in chronic wounds.

The reduced time to wound closure in the PRP group reflects PRP's effectiveness in hastening cellular repair and reducing inflammation at the wound site. Previous studies, such as Martinez-Zapata et al. (2012) and Driver et al. (2006), have similarly reported shortened healing times and faster epithelialization with PRP application, particularly in diabetic foot ulcers and other chronic wounds. The improved closure rates observed in this study suggest that PRP therapy could help minimize infection risks and improve outcomes in patients otherwise requiring prolonged wound care.

Due to quicker recovery and fewer problems, the PRP group experienced noticeably improved patient satisfaction. Because chronic wounds cause limited mobility, ongoing pain, and social shame, they frequently have an impact on mental health and quality of life. The quicker healing and reduced discomfort reported by PRP patients in this study align with findings from Agale (2013) and Rayner et al. (2009), which emphasize that efficient wound healing strategies directly improve patient well-being and satisfaction.

The absence of serious adverse effects in the PRP group highlights the safety of PRP therapy for chronic wound treatment. Mild discomfort and transient swelling were the only noted effects, indicating PRP's high tolerance and suitability for repeated applications. Previous studies have noted PRP's safety, with low risk of complications due to its autologous nature, which minimizes immune reactions and adverse effects (Obolenskiy et al., 2014; Anderson, 2006).

The relatively small sample size and six-month follow-up duration of this study may not adequately represent the long-term results and recurrence rates. To corroborate these findings, more extensive follow-up periods and larger patient cohorts are needed in future studies. Additionally, examining PRP's effectiveness across various chronic wound etiologies, such as venous ulcers and pressure ulcers, could provide insights into optimizing PRP applications based on wound type and patient profile (Suthar et al., 2017; Steed, 1995).

CONCLUSION

In conclusion, PRP therapy is a promising approach for treating chronic non-healing wounds, offering faster granulation, reduced healing time, and high

patient satisfaction with a strong safety profile. This study supports PRP's potential as an adjunctive therapy, particularly for patients with wounds unresponsive to conventional treatments. Expanding access to PRP therapy and refining protocols could make it a standard care option for chronic wound management.

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