

Effects of Platelet Rich Plasma in Chronic Wound Management

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Abstract: *Management of Chronic wounds are difficult to approach as it has various etiologies and etiology directed management. Moreover, comorbidities pose a challenging situation to deal with the outcome. Chronic wounds also involve a lot of health resources without any definitive outcome. Here in this study, we try to look for the effects of Platelet Rich Plasma in the management of chronic wounds. Patients with various possible etiologies and having various comorbidities were looked into. PRPs provide a cheap, readily available, easy to obtain, with minimal side effects, biological option in the management of chronic wounds.*

Keywords: Chronic wounds, Platelet Rich Plasma, Comorbidity, Management

1. Introduction

The term “wound” broadly refers to damage to any biological tissue, encompassing damage from amputation surgery to deep tissue injuries caused by loading during lower limb prosthetic use. The healthy, or normal, wound healing process is marked by four interlinked physiologic phases: I) hemostasis, II) inflammation, III) proliferation, and IV) tissue remodeling (or resolution).[1] This complex process demands a high degree of cellular coordination, including several avenues through which impairments can occur. Consequently, wound healing can be stalled (also referred to as non-healing, impaired, or chronic) not by one isolated factor, but by several smaller contributing issues. With increasing incidences of chronic conditions like obesity [4]. The burden of chronic wounds continues to pose an immense threat to patients and the healthcare system.

Etiologies underlying the formation of chronic wounds vary. Vascular disease, pressure, diabetes, obesity, ischemia, hypertension, and malnutrition are some of the leading causes of delayed and improper wound healing. Interestingly, it has been found that the regenerative potential of stem cells and platelets (especially platelet-rich plasma (PRP)) can serve as an appropriate alternate method for wound healing. Platelets are anucleated blood components, they circulate for 7–10 days in blood, critically modulating hemostasis and thrombo-inflammation [10] They secrete ample cytoplasmic granules, lysosomal content, microparticles, and exosomes, that play a pivotal role in regulating wound healing signalling mechanisms [10]. PRP (an autologous biological product isolated from a patient's blood) has a high platelet concentration compared to naïve plasma. PRP has a high concentration of growth factors and cytokines that participate in various cellular, immune, and regenerative processes, such as wound healing and tissue regeneration, with sufficient tissue reparative efficacy.

2. Methodology

Study Type: Hospital based cross sectional study.

Study Design: Prospective study design.

Place of study: Patients presenting in NRSMCH with the chronic wound in the Plastic and Reconstructive Department.

Study Duration: August 2023 to February 2025.

Study Population: Patients with chronic wounds presenting in the Plastic and Reconstructive Department.

Sampling Design: Purposive sampling done.

Sample Size: The study period is of 18 months which started from the approval date and the sample size was kept to 50 [27] with reference to the data collected from the master record of the Plastic Surgery department fulfilling the inclusion and exclusion criteria and willing to participate in the study after having the informed consent

Inclusion Criteria:

- Patients age between 15 and 70 years.
- All patients informed consent for participating in the data collection process
- All patients having the chronic wound in their body

Exclusion Criteria:

- Patients having acute wound issues will be excluded.
- Patients with age below 15 years and above 70 years will be excluded.

Study Variables:

- The wound-healing process is the key dependent variable of this research.
- Independent variable is the PRP treatment modality.
- Age.
- Gender.
- Aetiology of the chronic wound.
- Site of the wound.
- Duration of the wound healing process.

Study Tools & Techniques: Direct observation, interview, and clinical examination. The protocol of the research was submitted to the Institute Ethics Committee (IEC) of the NRS Medical College and Hospital, Kolkata for approval for the primary research. The study was approved by the ethical and scientific committee.

Informed consent:

Consent provided to the participants of the research whose data were used in this research.

3. Results & Discussion

Majority of the patients belonged to the age group of 51 to 60 years and 61 to 70 years each contributing to 45 %. Least contribution was from the young age group 15 to 50 years. In this study, majority of the population were male (70%) and the rest were female Majority of the ulcers (55%) were in Lower limb followed by foot with the least occurrence in forearm and sole each contributing 10%. Most of the patients (30%) had type 2 diabetes mellitus as comorbidity. This was followed by hypertension being present in 15% of the individual and hypothyroidism among 10% of the individual. However, 20% of the patients were free from any kind of comorbidities.

Significant decrease in the scar width has been observed in this study over 6 months with $p < 0.05$. Significant decrease in the mean area of the wound is observed over 6 months with $p < 0.05$. Significant reduction in the volume of the wound has been found over 6 months with a p value < 0.01 .

The mean percentage of epithelialisation has been found to increase significantly over 6 months with a p value < 0.01

4. Limitations of our Study

- This was a prospective cross sectional observational study, hence, there is no data available of follow up and subsequent changes over a period of time.
- This was a single centre study, only from one tertiary care centre of Eastern India.
- Sample size was kept small due to time constraints of this study. Thus, the analysis may not have been generalizable.
- Duration of study was relatively short, effective period for data collection was one (1) year.

5. Conclusion

In the present study, significant decrease in the scar width has been observed in this study over 6 months with $p < 0.05$ and significant decrease in the mean area of the wound is observed over 6 months with $p < 0.05$. Similarly, reduction in wound volume and increase in epithelialisation was also found to be significant with $p < 0.01$. The median visual assessment score representing the pain has been found to decrease over the 6 months. However, patients with peripheral vascular disease and Diabetes mellitus were slow responders to healing with PRP in comparison to patients without such comorbidities.

Observational study on the role of platelet rich plasma in the management of chronic wounds was conducted and the data can be used as feedback for educating and training the doctors and also be made aware of the current trends in this field. However, further studies on larger samples and longer durations are required to know the topic in a better way. The results of the study provide a baseline data for carrying out further studies in this area that would help in the improvement of knowledge and will also motivate the clinicians to

diagnosis and treat their patients in a better way. This will in turn ensure and improve patient care quality.

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