



ROLE OF PLATELET RICH PLASMA IN TREATMENT OF DIABETIC FOOT ULCER

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ABSTRACT To find out the efficacy of platelet rich plasma in treatment of diabetic foot ulcer who presented to the department of General Surgery, Meenakshi Medical College, Enathur, Kanchipuram for past 1 year.

KEYWORDS : Platelet Rich Plasma, Wagner Classification, PRP Preparation, Centrifuge, Wound Contraction

INTRODUCTION:

Platelet rich plasma (PRP) is an autologous platelet rich concentrate prepared from patients own blood with growth factors up to 8 times that of normal serum. PRP serves as growth factor agonist and has both mitogenic and chemotactic properties.

India with approximately 42 million cases is ranked in the list of ten nations most affected with Diabetes. Among diabetes mellitus complication, Foot ulceration is the most common affecting approximately 15%. Foot ulceration is the preventable and relatively simple intervention and reduce amputation by up to 80%.

PATIENTS AND METHODS:

From dec 2015 till jan 2016 ,50 Patients admitted to the surgical wards in Meenakshi Medical College & RL, Enathur, Kanchipuram were selected to the study according to the following inclusion and exclusion criteria

Inclusion Criteria : 1. Patients : Diabetic Patients 2. Age Group : 30-80 years 3. Sex : Both sexes. Exclusion Criteria 1. Age Group : <30 years and >80years old patients 2. Hemoglobin : Less than 10g/dl 3. Ulcer grade : Wagner Grade-IV ,V of diabetic foot ulcer classification 4. Immuno compromised patients who have AIDS, on steroidal therapy

Informed consent was obtained from all the patients. Complete history, clinical examination laboratory and radiological investigation were obtained and entered . Laboratory investigations like Hb%, BT, CT, FBS, PPBS, HbA1c, Blood Urea, Serum Creatinine, Urine for Albumin, Sugar, Microscopy, ECG, X Ray of chest, affected foot was done.

9ml of patients' blood is withdrawn using a 18G needle to limit irritation and trauma to platelet, so that they would remain in intact state.

In First spin the tube is spun at 250G for 10min. 3 Layers are formed due to difference in density of blood components. The top layer is Platelet Poor Plasma. The middle layer contains Platelet and Leukocytes and deep layer contains Red Blood Cells. Middle layer and top layer are collected by gentle aspiration with pipette and transferred to new sterile centrifuge tube.

During Second spin the tube is spun at 500G for 10 min, the top two thirds of the portion accepted as platelet poor plasma are removed. Remaining part is considered Platelet rich plasma and is obtained for transfer onto wound site.

The platelet rich plasma is then applied over the ulcer area and covered with gauze and dressing done with pad and roller bandage. Patient are advised to take appropriate care of the wound dressing.

In both groups, dressing is changed, daily morning dressing change for control group and once in 5 days for study group. The ulcer is closely monitored and whenever debridement is needed, it is done and respective dressing applied. The initial area and final area of the ulcer size is measured and values recorded in chart for statistical analysis.

After recording the values in both the group, we calculated the percentage of reduction in ulcer size after 30 days using the below formula for each patient in both groups.

$$\text{Percentage of wound contraction} = \frac{(\text{Initial wound area} - \text{Final wound area})}{(\text{Initial wound area})} \times 100$$

RESULTS:

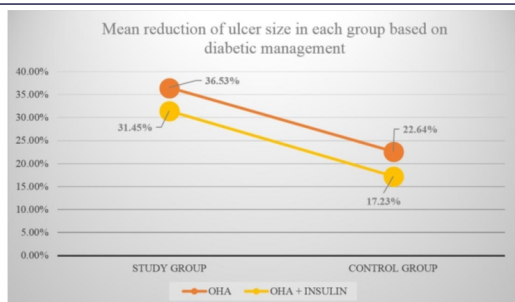
1. In our study 20 male, 5 female constituted the study group and 13 male, 12 female constituted the control group.
2. In our study it was observed that the diabetic foot ulcer was commonest among 7th decade of age.
3. Predisposition of diabetic foot ulcer was more common among males than in females.
4. More number of diabetic patients presented with diabetic foot ulcer arising from trauma than those occurring spontaneously. The spontaneous ulcers healed better with PRP than those arising due to traumatic onset.
5. The common occurrence of diabetic foot ulcer was found to be in the plantar aspect than on dorsal aspect.
6. Patients presenting early with less severe Wagner grade improved in healing than those who came with later stage of Wagner grade. PRP dressing improved the rate of healing in lower Wagner grade ulcer than in higher grade ulcer.
7. Patients who were on OHA alone showed better healing than those on OHA + Insulin.
8. Overall PRP dressing group showed higher rate of ulcer size reduction than those on Saline dressing. This shows PRP as a good alternative to regular ulcer dressing.
9. In our study the median area of reduction of ulcer size was more in study group as compared to control group and the standard deviation of reduction of ulcer size was 3.99 in study group and 4.63 in control group.

Mean reduction of ulcer size in each group based on site

Site	Study group	Control group
Dorsal	32.28%	20.5%
Plantar	33.20%	17.74%

Mean reduction of ulcer among Wagner grade in each group

Grade	Study group	Control group
Grade 1	33.8%	18.6%
Grade 2	31.9%	19.27%
Grade 3	32.89%	16.59%



DISCUSSION:

Diabetic foot ulcers represent a major cause of morbidity between diabetic patients that can seriously impair quality of life and often result in limb loss. Platelet Rich Plasma have been suggested to be a useful adjunct in order to achieve ulcer healing in these patients. These are biologically active polypeptides that act to alter the growth, differentiation, and metabolism of target cells stimulating cellular proliferation, chemotaxis, and angiogenesis

Wagner Grade : In the present study it was observed that 50% patients had Wagner Grade 2 ulcer, 36% patients had Wagner Grade 1 ulcer and 14% patients had Wagner Grade 3. Among them the mean reduction of ulcer size was more in Wagner Grade 1 patients (33.8% in study and 18.6% in control group) compared to other 2 Grade of ulcers. Yao Huang et al²³⁸ reported similar observation that Wagner Grade 1 has better rate of healing than other Wagner Grades.

Diabetic Management: In the present study it was observed that patients who were on OHA alone had higher (29.58%) mean reduction in ulcer size than compared to patients who were on OHA and insulin (24.34%). This observation was contradictory to N.K. Rai et al¹⁵⁷ study which showed significant increase in apoptosis in diabetic wounds, which in turn contributes to delayed wound healing, more in patients on OHA's than those on insulin.

In the present study we observed that there was significant improvement in wound healing between PRP dressing and normal dressing. The Standard deviation for study group was 3.99 and 4.63 for control group. The Median for study group was 32.2 and 18.3 in control group. And on applying the Unpaired t test, we obtained a P value of <0.0001. Since any value of P <0.05 is significant, our study was also statistically significant. The 95% confidence interval was 11.63 to 16.55, R squared value was 0.7341.

CONCLUSION

The diabetic ulcer in the study group treated with PRP dressing contracted in wound size more than in the control group (30.46% Vs. 23.6%; with P value < 0.0001 which is statistically significant). This indicates that PRP dressing is an effective method to facilitate wound contraction in diabetic patients with foot ulcer. PRP dressing is found to be more effective, cost efficient and safe promoter of ulcer wound healing and can be used as an adjunct to saline dressings for enhanced healing of diabetic wounds.

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