

Conventional Ordinary and PRP in Management of Diabetic Foot Ulcer- A Comparative Study

Ajay Agarwal¹, Aseem Majumdar²

^{1,2}Assistant Professor, Department of Surgery, Rajshree Medical Research Institute Bareilly, UP.

Abstract

Background: Diabetes mellitus is a clinical syndrome characterized by hyperglycemia caused by absolute or relative deficiency of insulin. The present study was conducted to compare PRP and conventional dressing in management of diabetic foot ulcer. **Subjects and Methods:** The present study was conducted on 120 patients with diabetic foot ulcers. Patients were divided into 2 groups of 60 each. Group I was those who received conventional dressing and group II patients received PRP dressings. Patients were examined and recalled regularly to see effect of dressing and size of the lesions. **Results:** Common site was mid foot seen in 35 and 30 in group II, fore foot seen 20 in group I and 18 in group II, hind foot seen 5 in group I and 12 in group II. The difference was non-significant ($P > 0.05$). At 0 week mean size of DFU was 4.2 mm in group I and 4.1 mm in group II, at 1 week was 4.0 mm in group I and 3.8 mm in group II, at 3rd week was 3.6 mm in group I and 2.4 mm in group II and 2.6 mm in group I and 1.2 mm in group II. The difference was significant ($P < 0.05$). **Conclusion:** Platelet rich plasma was effective in the management of diabetic foot ulcer. There was comparatively increase in size reduction in PRP group than conventional group.

Keywords: Diabetes, Platelet rich plasma, Ulcer.

Corresponding Author: Dr Aseem Majumdar, Assistant Professor, Department of Surgery, Rajshree Medical Research Institute Bareilly, UP.

Received: September 2019

Accepted: September 2019

Introduction

Diabetes mellitus (DM) is one of the most deceitful diseases that affect more than 371 million people all over the world in 2012. Diabetes mellitus is a clinical syndrome characterized by hyperglycemia caused by absolute or relative deficiency of insulin. Diabetes mellitus is of two types.^[1] Type 1 DM was previously known as insulin dependent diabetes mellitus (IDDM). Type 2 DM was previously termed as non insulin dependent diabetes mellitus (NIIDM).^[2]

There are several complications of DM. Among all, diabetic foot ulcer, diabetic neuropathy, diabetic nephropathy, diabetic retinopathy and diabetic foot ulcer are common.^[3] In diabetic foot, ulceration occurs as a result of trauma in the presence of neuropathy and/or peripheral vascular disease with infection as a secondary phenomenon following disruption of the protective epidermis. The disease often leads to the development of serious health threatening complications.^[4]

One of the most common causes of chronic wounds is growth factor abnormality. Platelets are considered a rich source of growth factors.^[5] Platelet-rich plasma (PRP) enhances wound healing by either the barrier effect to prevent bacterial invasion into the wound or the growth factors stimulate wound healing. About 15% of diabetic patients will develop chronic wounds and about 25% of these patients will have to undergo foot amputation. The healing

process is impaired in part because of deficiency of growth factors.^[6] The present study was conducted to compare PRP and conventional dressing in management of diabetic foot ulcer.

Subjects and Methods

The present study was conducted in the department of Surgery. It comprised of 120 patients with diabetic foot ulcers. The study was approved from the institutional ethical committee. All were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 60 each. Group I was those who received conventional dressing and group II patients received PRP dressings. Patients were subjected to fasting blood sugar, random blood sugar and glycosylated hemoglobin to know diabetic status. A thorough clinical examination was done. Excision of necrotic tissue was extended as deeply and proximally as necessary until healthy, bleeding soft tissue encountered. Patients were examined and recalled regularly to see effect of dressing and size of the lesions. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table 1: Distribution of patients

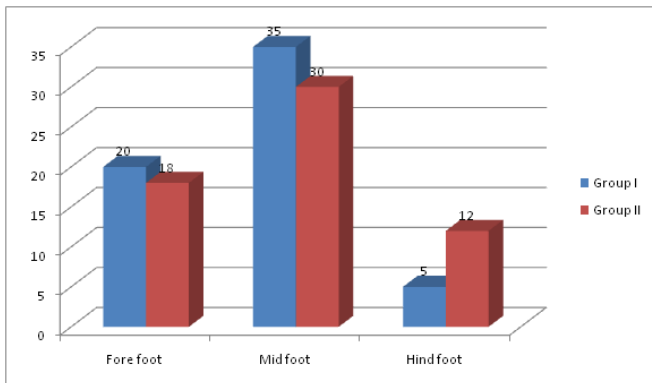
Total- 120		
Groups	Group I (conventional dressing)	Group II (PRP dressing)
Number	60	60

[Table-1] shows that out of 120 patients, group I patients received conventional dressing and group II patients received PRP dressings.

Table 2: Site of ulcer

Site	Group I	Group II	P value
Fore foot	20	18	0.32
Mid foot	35	30	
Hind foot	5	12	

[Table 2], graph I shows that common site was mid foot seen in 35 and 30 in group II, fore foot seen 20 in group I and 18 in group II, hind foot seen 5 in group I and 12 in group II. The difference was non- significant ($P > 0.05$).

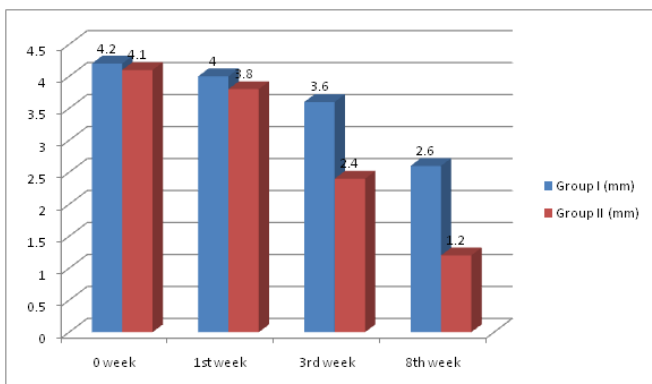


Graph 1: Site of ulcer

Table 3: Comparison of size of lesion in both groups

Duration	Group I (mm)	Group II (mm)	P value
0 week	4.2	4.1	0.81
1 st week	4.0	3.8	0.45
3 rd week	3.6	2.4	0.05
8 th week	2.6	1.2	0.01

[Table 3], graph II shows that at 0 week mean size of DFU was 4.2 mm in group I and 4.1 mm in group II, at 1 week was 4.0 mm in group I and 3.8 mm in group II, at 3rd week was 3.6 mm in group I and 2.4 mm in group II and 2.6 mm in group I and 1.2 mm in group II. The difference was significant ($P < 0.05$).



Graph 2: Comparison of size of lesion in both groups

Discussion

Diabetic foot ulcers (DFUs) are a prevalent complication of diabetes mellitus and account for significant morbidity, mortality, and healthcare expenditures.^[7] It is estimated that 19–34% of patients with diabetes are likely to be affected with a diabetic foot ulcer in their lifetimes, and the International Diabetes Federation reports that 9.1–26.1 million people will develop DFUs annually. These numbers are alarming, as the clinical implications for the development of a DFU are not negligible. Diabetic foot ulcers result from the simultaneous action of multiple contributing causes. The major underlying causes are noted to be peripheral neuropathy and ischemia from peripheral vascular disease. More than 60% of diabetic foot ulcers are the result of underlying neuropathy.^[8] The development of neuropathy in affected patients has been shown in animal and in vitro models to be a result of hyperglycemia-induced metabolic abnormalities. One of the more commonly described mechanisms of action is the polyol pathway.^[9] The present study was conducted to compare PRP and conventional dressing in management of diabetic foot ulcer.

In present study, out of 120 patients, group I patients received conventional dressing and group II patients received PRP dressings.

We found that common site was mid foot seen in 35 and 30 in group II, fore foot seen 20 in group I and 18 in group II, hind foot seen 5 in group I and 12 in group II. Prakasam et al^[10] compared Platelet-Rich Plasma versus conventional dressing in the management of diabetic foot ulcers. Group A received conventional ordinary dressing (N=10, 50%) and Group B received PRP dressing (N = 10, 50%). The mean follow-up period was 8 weeks. The estimated time of wound healing was 8 weeks and healing was found to be more effective for patients in group B compared to patients in group A; the PRP group was found to be more effective in wound healing with fewer complications, less infection, exudates and pain.

We found that at 0 week mean size of DFU was 4.2 mm in group I and 4.1 mm in group II, at 1 week was 4.0 mm in group I and 3.8 mm in group II, at 3rd week was 3.6 mm in group I and 2.4 mm in group II and 2.6 mm in group I and 1.2 mm in group II. Kumar et al^[11] found that age group 20-30 years had 1 male and 2 females, 30-40 years had 12 males and 10 females, 40-50 years had 13 males and 10 females and >50 years had 20 males and 14 females. The occurrence of ulcer was fore foot (males- 12, females- 8), mid foot (males- 26, females- 18) and hind foot (males- 8, females- 10). The size of ulcer decreased significantly which was 4.2 cm² in males and 3.8cm² in females on 0 day, 3.6 cm² and 3.2 cm² in females at 1st week, 2.4 cm² and 2.6 cm² in males and females at 3rd week and 1.2 cm² and 0.8 cm² in males and females respectively at 8th week.

Crovetti et al^[12] study was focused on 80 diabetic wounds. Patients were divided into two groups: group A received conventional ordinary dressing (N=40, 50%) and group B received PRP dressing (N=40, 50%). The mean follow-up period was 12 weeks. The estimated time of wound healing was 12 weeks for 82.5% of the patients in group A and 97.5% of the patients in group B; the PRP group was found

to be more effective with fewer complications, less infection, exudates, pain, and failed healing: 17.5, 12.5, 32.5, and 2.5% versus 27.5, 42.5, 62.5, and 17.5% in group B, respectively. The highest healing rate was observed for both groups at the fourth week, but it was better for the PRP group (group B): 0.89 ± 0.13 versus 0.49 ± 0.11 cm²/week in group A.

Conclusion

Platelet rich plasma was effective in the management of diabetic foot ulcer. There was comparatively increase in size reduction in PRP group than conventional group.

References

1. Steed DL. Clinical evaluation of recombinant human platelet-derived growth factor for the treatment of lower extremity ulcers. *Plast Reconstr Surg.* 2006;117:143-9.
2. Ronfard V, Williams T. Developments in cell-based therapy for wounds. In: Ronfard V, Williams T, editors. *Advances in wound care.* Volume. New Rochelle, NY: Mary Ann Liebert Inc. Publications; 2012;1:412-8.
3. Gentzkow GD, Iwasaki SD, Hershon KS. Use of dermagraft, a cultured human dermis, to treat diabetic foot ulcers. *Diabetes Care.* 2003;19:350-4.
4. Mulder G, Tallis A, Marshall V. Treatment of non-healing diabetic foot ulcers with a platelet-derived growth factor gene-activated matrix (GAM501): results of a phase 1/2 trial. *Wound Repair Regen.* 2009;17:772-9.
5. Bhatia A, Bains SK. Platelet rich Plasma. *Journal of Stomatognathic Sciences.* 2017; 7 (1): 22-25.
6. Moshiri A, Oryan A. Role of platelet rich plasma in soft and hard connective tissue healing: an evidence based review from basic to clinical application. *Hard Tissue* 2013; 2:6.
7. Kathleen M, Lacci B, Dardik A. Platelet-rich plasma: support for its use in wound healing. *Yale J Biol Med* 2010; 83:1-9.
8. De Pascale M, Sommese L, Casamassimi A, Napoli C. Platelet derivatives in regenerative medicine: an update. *Transfus Med Rev* 2015; 29:52-61.
9. Martinez-Zapata MJ, Martí-Carvajal AJ, Solà I, Expósito JA, Bolívar I, Rodríguez L. Autologous platelet-rich plasma for treating chronic wounds. *Cochrane Database Syst Rev* 2012; 10:89-92.
10. Prakasam N, Prabakar MS, Reshma S, Loganathan K, Senguttuvan K. A clinical study of platelet rich plasma versus conventional dressing in management of diabetic foot ulcers. *Int Surg J* 2018;5:3210-6.
11. Kumar V. Management of Diabetic Foot Ulcer using Platelet Rich Plasma Dressings- A Clinical Study. *J Adv Med Dent Scie Res* 2015;3(2):191-193.
12. Crovetti G, Martinelli G, Issi M. Platelet gel for healing cutaneous chronic wounds. *Transfus Apher Sci.* 2009;30:145-51.

Copyright: © the author(s), 2019. It is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits authors to retain ownership of the copyright for their content, and allow anyone to download, reuse, reprint, modify, distribute and/or copy the content as long as the original authors and source are cited.

How to cite this article: Agarwal A, Majumdar A. Conventional Ordinary and PRP in Management of Diabetic Foot Ulcer- A Comparative Study. *Acad. J Surg.* 2019;2(2):37-39.

DOI: [dx.doi.org/10.21276/ajs.2019.2.2.10](https://doi.org/10.21276/ajs.2019.2.2.10)

Source of Support: Nil, **Conflict of Interest:** None declared.