Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/18500
DOI URL: http://dx.doi.org/10.21474/IJAR01/18500

RESEARCH ARTICLE

ROLE OF PRP IN DIABETIC FOOT ULCER

Dr. Nikita Karmakar[1], Dr. Punit Sharma[1] and Dr. Bikash Sandalya[2]

1. 3rd Year, General Surgery Resident, SMCH.
2. Associate Professor, SMCH.

Manuscript Info

Manuscript History
Received: 30 January 2024
Final Accepted: 29 February 2024
Published: March 2024

Key words:-
Diabetic Foot Ulcers (Dfus), Platelet Rich Plasma (PRP)

Abstract

Introduction: Diabetic Foot Ulcers (Dfus) are among the most common complications of diabetes mellitus with a lifetime incidence of up to 15% among the diabetic population. Current standard management consists of surgical debridement followed by frequent dressing changes with tight infection and glycemic control. Despite this comprehensive approach, complication and amputation rates remain high. A newer treatment modality PRP gel dressing is being investigated.

Method: This study is a prospective comparative study done in Dept of General Surgery for period of 9 months with 30 diabetic patients with chronic non healing foot ulcer. PRP dressings were done biweekly for 8 weeks. **Result:** 80% patients in present study were more than 40yrs.Hypertension was present in 80% of patients in both control and PRP group and hyperlipidemia was present in 66% of control group and 73% in PRP group. After regular biweekly dressing with PRP gel, by the end of eight weeks PRP dressing patients showed better wound healing with p value < 0.05 In PRP dressing group rate of ulcer healing was found to be maximum in 4 weeks after which this rate declined.

Conclusion: The present study supports the conclusion that autologous PRP gel does effectively accelerate wound healing in clean diabetic foot ulcers when compared with the conventional saline gauze antiseptic dressing.

Introduction:-

Diabetic foot ulcers (Dfus) are among the most common complications of diabetes mellitus with a lifetime incidence of up to 15% among the diabetic population. A chronic wound is a wound that does not heal in an orderly set of stages and in a predictable amount of time the way most wounds do; wounds that do not heal within 3 months are often considered chronic (1). Studies have shown that up to 80% of patients with Dfus suffer from both limb ischemia and peripheral neuropathy simultaneously. These conditions further delay the healing of Dfus, predisposing to higher rates of complications such as cellulitis and osteomyelitis. In spite of the high prevalence and morbidity associated with Dfus, current standard management consists of surgical debridement followed by frequent dressing changes with tight infection and glycemic control. The rates of complications and amputations persist high in spite of this all-encompassing strategy. Growth factors (Gf) are essential for prompt wound healing, and low Gf levels may play a significant role in the wound's chronicity (3). Chronic wounds may prevent the synthesis and release of growth factors (Gf), cause the factors to be sequestered and unable to carry out their metabolic functions,

Corresponding Author:- Dr. Nikita Karmakar
Address:- 3rd Year, General Surgery Resident, SMCH.

or cause the factors to be excessively degraded by bacterial or cellular proteases (3) Among the different methods to achieve ulcer healing, platelet-rich plasma (PRP) gel is gaining popularity. It is thought to stimulate wound healing by providing essential growth factors for wound healing process. This study aims to evaluate the value of autologous PRP gel in the treatment of diabetic foot ulcers.

Patients And Methods:-

This study is a prospective comparative study that took place in the department of general surgery, Silchar medical college, Assam for period of 9 months from oct 2022 to June 2023.We aimed at recruiting 30 diabetic patients with chronic non healing foot ulcer with the following inclusion and exclusion criteria.

Inclusion criteria-

Age between 18 to 70 years both male and female, diabetic patients with controlled blood sugar levels, persistent wound for 2 to 3 months, wound of size 2 to 5 cm max length.

Exclusion criteria-

Hepatitis, HIV, post skin grafts, critically ill patients with immunological disorders

Patients were allocated randomly into two groups according to dressing methods used- Group A received conventional dressing (n= 15) and Group B received autologous PRP dressing (n= 15).

PRP Gel Preparation

PRP was prepared from the patient's own blood (autologous PRP). 20ml of venous blood were drawn in syringe and mixed with an anticoagulant to avoid platelet activation and degranulation. Whole blood was centrifuged at 1500 RPM for 5 min at 23°C. to obtain plasma. Then, this plasma was centrifuged at 3,500 rpm for 5 min to collect platelets as a pellet at the bottom of the centrifuge tube. Pellet was diluted in 3-mL plasma and was considered as PRP and used for the PRP treatment after activating with 10% calcium chloride to form PRP gel. The gel was applied on the wound after being washed with 0.9% normal saline solution and covered with sterile nonabsorbing dressing twice weekly.

Results:-

Table 1 shows demographic and clinical comparison of control group and PRP group. Hypertension was present in 80% of patients in both control and PRP group. Hyperlipidemia was present in 66% of control group and 73% in PRP group.

Parameters	**Control group A N=15**	**PRP group B N=15**
Mean age (years)	45.6	40.2
Gender(male:female)	4:1	6:1
Hypertension	12	12
Hyperlipidemia	10	11

Table 1:-

Table 2 shows efficacy of PRP dressing group with control group, by the end of eight weeks PRP group shows better wound healing with 80% of patients completely healed ulcer whereas only 64% of patients completely healed ulcer in control group. In PRP dressing group rate of ulcer healing was found to be maximum in 4 weeks after which this rate declined.

Weeks	**Parameters**	**Control group A**	**PRP group B**	**P value**
Two weeks	Ulcer healed	0	1	0.003

	Rate of healing/week in cm2	0.1	0.5	0.07
Four weeks	Ulcer healed	4	6	0.01
	Rate of healing/week in cm2	0.3	0.9	0.04
Eight weeks	Ulcer healed	5	5	0.02
	Rate of healing/week in cm2	0.5	0.6	0.12
Total healed ulcer		9 (64%)	12 (80%)	0.04

Table 2:-Efficacy of control group versus PRP dressing group.

Before application of PRP

After application of PRP

Discussion:-

One of the most common effects of diabetes in the lower limbs is diabetic foot ulcers. 15% of diabetic patients are predicted to experience lower extremity ulcers at some point in their illness (4).Present study was aimed at comparing the efficacy of PRP dressing over conventional dressing.

In present study 80% of patient were more than 40 yr. This is expected as usually older age is associated with a longer duration of diabetes which directly increases risk of diabetic foot ulcer. Previous studies such as Akashdeep Singh et al(5) (mean age of 54.9 yrs) and by Atef (6) (mean age was 48 yrs) also report a predominance of older age individuals in their study population. The majority of the study population in present study was male. This result was consistent with earlier research findings.

The current study discovered that the group receiving PRP dressings had a statistically faster rate of wound healing and contraction than the control group receiving traditional saline gauze antiseptic dressings. Clinical research has demonstrated through numerous trials that the application of PRP dressings results in improved wound closure, significantly faster healing rates, and shorter healing timeframes. The role of PRP in accelerating healing of chronic ulcers was supported by several studies (7,8,9) We also observed a significant slower rate of wound healing by the end of the eighth week, which may suggest the end point for this type of application. This may be explained by the high concentration of growth factors that lead to receptor down regulation.

Conclusion:-

The present study supports the conclusion that autologous PRP gel does effectively accelerate wound healing in clean diabetic foot ulcers when compared with the conventional saline gauze antiseptic dressing.

Funding:
No funding sources.

Conflict of interest:
No.

Ethical approval:
The study was approved by the Institutional Ethics Committee.

References:-

1. Mustoe TA. Dermal ulcer healing: advances in understanding. Presented at meeting: tissue repair and ulcer/wound healing: molecular mechanisms, therapeutic targets and future directions; 2005 Mar 17–18; Paris, France. URL http://www.pasteur.fr/applications/euroconf/tissuerepair/mustoe_abstract. pdf
2. Mustoe TA. Understanding chronic wounds: a unifying hypothesis on their pathogenesis and implications for therapy. Am J Surg 2004;187: S65–70.
3. Crovetti G, Martinelli G, Issi M, Barone M, Guizzardi M, Campanati B, Maroni M, Carabelli A. Platelet gel for healing cutaneous chronic wounds. TransfusApher Sci 2004;30:145–51.
4. Ramsey SD, Newton K, Blough D, McCulloch DK, Sandhu N, Reiber GE, Wagner EH. Incidence, outcomes and costs of foot ulcers in patients with diabetes. Diabetes Care 1999;22:382–7
5. Akashdeep, Dr., et al. “Efficacy of Autologous Platelet Rich Plasma (PRP) Dressings in Diabetic Foot Ulcers: An Observational Study.” International Journal of Orthopaedics Sciences, vol. 5, no. 3, 1 July 2019, pp. 539–543, https://doi.org/10.22271/ortho.2019.v5.i3j.1586. Accessed 28 Mar. 2022.
6. Yousef AA, Mansour MA, Allam AK, Ibrahim KM. Platelet Rich Plasma (PRP) Versus Conventional Ordinary Dressing In Management Of Diabetic Foot Ulcer & Wound. 2015; 1-17.
7. Steed DL, Goslen JB, Holloway GA. CT-102 activated platelet supernatant, topical versus placebo: a randomized prospective double blind trial in healing of chronic diabetic foot ulcers. Diabetes Care 1992;15:1598–604.
8. Glover JL, Weingarten MS, Buchbinder DS, Poucher RL, Deitrick GA 3rd, Fylling CP. Four year multicenter retrospective study of topical multiple growth factor therapy for chronic wounds. Adv Wound Care 1997;10:27–32.
9. O’Meara SM, Cullum NA, Majid M, Sheldon TA. Systematic review of antimicrobial agents used for chronic wounds. Br J Surg 2001;88:4–21.