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Research Article

**A CLINICAL STUDY OF PLATELET RICH PLASMA
VERSUS CONVENTIONAL DRESSING IN MANAGEMENT
OF DIABETIC FOOT ULCERS****¹Dr. Khawar Rafique, ²Dr. Marium Khalid, ³Dr. Muhammad Tabish Javaid**¹MBBS; Lahore Medical and dental college, Lahore, Pakistan.^{2,3}MBBS; King Edward Medical University Lahore, Pakistan.**Article Received:** January 2020 **Accepted:** February 2020 **Published:** March 2020**Abstract:**

Growth factor abnormality is one of the major causes of chronic wounds. Platelets are known as a rich source of growth factors. 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. Platelet rich plasma increases the wound healing by two ways 1) effective barrier to avoid bacterial infringement into the wound 2) enhances growth factor which stimulates wound healing. There have been many progresses in tissue regeneration therapy in the use of PRP therapeutic process. PRP is one of the most powerful techniques which can be used for the treatment of chronic wounds it enables healing, and reduces amputation rates, infection and exudates.

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INTRODUCTION:

Growth factor abnormality is one of the major causes of chronic wounds. Platelets are known as a rich source of growth factors. 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. Platelet rich plasma increases the wound healing by two ways 1) effective barrier to avoid bacterial infringement into the wound 2) enhances growth factor which stimulates wound healing [1]. Chronic wounds are very common among diabetic patients 15% of the patients will develop chronic wounds and about 25% will have to undergo foot amputation. Due to deficiency of growth factors the healing process is weaken [2].

In case of difficulty in the treatment of wounds there are significant advancements such as cell therapy and cell containing tissue engineered therapy. At present time, with the approval of US FOOD and Drug administration there are only two cells containing tissue-engineered therapy for the treatment of wounds. To speed up the wound healing apligraf and dermagraft available but it demand multiple sessions per week moreover it has short life span and are exorbitant. Another human platelet derived growth factor which is known as bovine collagen gel (GAM501) use for the treatment of small non healing diabetic foot ulcers [3, 4].

Regardless of many researches, there is still need of effective and more practical therapy for the treatment of non-healing diabetic ulcers. The platelet concentration with plasma sample above the baseline values are referred as PRP [5]. When the new biological glues were being discovered in the 1990s the clinical effectiveness of PRP was determined [6]. Currently it has been using widely in many clinical and other surgical fields where there is requirement of regeneration such as dentistry, orthopedics, wound healing and maxillofacial surgeries [7]. PRP can be prepared in any way either by autologous and allogenic source.

Literature has strong evidence about the well and clinically effective use of autologous platelet which is more acceptable and has low risk of viral infection transfer. Lower concentrations cannot be used to enhance healing and higher concentrations have not been shown to increase healing [8]. Blinded, multicentric, randomized-controlled studies with large sample sizes are urgently needed to establish their therapeutic efficacy. There are no universally established standards for the collection, quality control, and administration of the product [9] [10]

METHODS:

It was a randomized controlled study. 24 patients were recruited into this study according to the defined criteria. The inclusion criteria was age between 40-65 years, both male and female, presence of diabetes with controlled sugar level, non-healing ulcers on their feet, chronic wound for 2-3 months, size of the wound ranges from 4 to 5cm. whereas the exclusion criteria contains presence of any other co-morbid disease, such as severe cardiovascular disorders, hepatitis, HIV, patients who had received conventional skin grafting in the past, critically ill patients with immunological disturbances were excluded. All the participants falling into inclusion criteria were subjected for further assessment and investigations to rule out the risk factors and treatment of diabetic foot disorders

A written informed consent was taken from the participants after explaining the purpose of the study. Two groups were made on the basis of intervention strategy. Patients were randomly assigned into both groups. The participants were allocated on the basis of the dressing method. In group A all the participants were receiving normal dressing (N=12, 50%) whereas in group B the participants received PRP dressing (N=12, 50%). A scalpel, curette, and scissors were used for the non-healing wounds or sharp debridement of heavily infected wounds. Debridement converted a chronic or a heavily infected wound to one that was acute by removing nonviable tissue that could stimulate excessive inflammation and bacterial growth. The infected area was opened by using a simple incision. Excision of necrotic tissue was extended as deeply and proximally as necessary until healthy, bleeding soft tissue encountered. Any callus tissue surrounding the wound was removed. Metronidazole gel was applied to the wound after debridement. At fourth day the wound should be left open and inspected. The participants of Group A were treated by ordinary dressing in which surgical debridement was done to remove all necrotic tissue, infected cavities were drained out and the prepared dressing material was used. PRP therapy was applied to Group B patients. The dressing protocol of these patients included PRP. PRP was injected about 3/4th of a cm away from the edge of the ulcer at a distance of 3/4th of a cm away from each injection site, after being prepared (within half an hour after preparation), followed by gauze and then dressing. Once in four days the dressing was changed. The protocol was followed up to 8 weeks. The injection is done about three fourth of a cm, away from the wound edge so as to prevent loss of PRP from the wound edge margin and from the floor. The direction of the needle is pointed downwards and towards the centre of the base as most of the regeneration takes place at the base of the ulcer. The distance between two

injections is about two - third of a cm apart. All along the procedure care is taken to prevent loss of PRP from the floor by injecting it in deeper level. Dressing was done using metrogyl gel to preserve the moisture. The injection is repeated at four days interval and wound is not disturbed in between. The patient needed 6 to 8 doses according to the ulcer size.

Data was analyzed by using SPSS version 21. Quantitative data were presented as mean and SD were analyzed using t-test to compare quantitative variables as parametric data SD mean. Qualitative data were presented as numbers and percentages and were analyzed using χ^2 and Fisher's exact tests. A P-value of less than 0.05 was considered significant.

RESULTS:

It was a prospective study. 24 diabetic patients with non-healing foot ulcers were included into the study. The group was divided according to the method of dressing. Group A contains conventional ordinary dressing whereas Group B contains PRP dressing.

The mean age of the participants was 50.4 ± 5.84 years. The duration of diabetes in the patients ranged between 7 and 12 years with a mean of 9.35 ± 1.59 years, and the size of the wound ranged between 4 and 5 cm with a mean of 5.62 ± 0.33 cm. After two weeks the PRP was started showing effective results. At the fourth week the same result was found. According to the rate of healing, after two weeks there was a greater rate of healing per week in group A than group B. But the healing rate was far good at the fourth week in both groups. The higher healing rate was found at 6th and 8th week in PRP group. But in the conventional group there was least rate of healing at the 8th week. The healing rate was accelerated at the 8th week after PRP injection.

There was a statistically significant difference between both groups. The total rate of healing was higher in Group B (PRP treated) than Group A (conventional ordinary dressing).

DISCUSSION:

The common clinical problem is diabetic foot wound. There is a clear shift towards the risk of chronic wounds because of contributing factors such as tobacco use, obesity, hypertension, and atherosclerosis and other co-morbidities [11]. For more than 20 years, the PRP has been used to promote wound healing. The current study was executed to assess the effectiveness of PRP in promoting healing of diabetic foot wounds, preventing infection, and reducing exudates, besides its preventive action by reducing amputation rates [12, 13]. In the recent years of tissue regeneration there have been many advances

in the PRP use for advance therapies. According to the research of last decade Carter et al recommend that PRP therapy have positive influence on the wound healing and other factors which are linked with the wound such as pain or infection acute or chronic wound [15]. A study was conducted by Saad et al, reported that age and gender has no significant impact on the healing of chronic wound ulcers [16].

In the current study, the site of diabetic feet wounds was generally the sole of the foot. The duration of diabetes ranged between 7 and 12 years, it was observed that there was no association between the site and the rate of healing. This result was reported by Gui-Qiu et al, who studied the effect of PRP on healing of lower extremity chronic ulcers in 21 patients, they concluded that 'there was no significant difference between type and site of ulcers in correlation with rate of healing [17, 18]'. In this study, wounds varied in size and ranged between 4.9 and 8.6 cm, with a mean of 6.4 ± 0.7 cm. It was observed that there was a significant and strong inverse correlation between the rate of healing and the size of the wounds, and there was a significant and strong proportional correlation between the size of the wounds and treatment duration ($P=0.001$). Also, there was a significant and strong proportional correlation between the size of the wounds and the number of injections. Many trials concluded that the larger the ulcer, the longer the duration required for treatment and the greater the number of injections. Upon review of risk factors and co-morbidities, diabetes represents a worldwide public health issue, affecting 5% of the population of the USA [20]. Its high prevalence places this disease among one of the main pathologies that can progress to chronic ulceration. Other risk factors found in this study included diabetic related comorbidities, foot angiopathy, and retinopathy, which affected wound healing and care, and smoking in 48 (60%) patients, which might have impaired wound healing directly or indirectly through vascular bad effect of smoking [21, 22]. In the current study, PRP was found to be more effective than conventional dressing after the second week. The same effect was reported at the fourth week.

CONCLUSION:

There have been many progresses in tissue regeneration therapy in the use of PRP therapeutic process. PRP is one of the most powerful techniques which can be used for the treatment of chronic wounds it enables healing, and reduces amputation rates, infection and exudates.

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