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PLATELET-RICH PLASMA USE IN THE TREATMENT OF ECZEMA (ATOPIC DERMATITIS): CASE REPORT

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ABSTRACT

Background: In the last few decades, thousands of patients have benefited from platelet rich plasma (PRP) therapies and its use in medicine has become increasingly more widespread during the last decade. Eczema (atopic dermatitis) is a complex disorder caused by the interplay between multiple genetic and environmental factors.

Materials& Methods: Patients with eczema for more than 6 months were selected. Subjects with any other medical disorder were excluded by history, examination and routine blood tests. Fifteen cc venous blood samples were collected on day 0, day 15, and day 30 for the following biochemical, hematological and inflammatory markers parameters were carried first rest of the blood sample was used for the PRP. Three consecutive PRP therapies were conducted with a gap of 15 days in between. The affected area was photographed at each visit before performing procedure.

Result: Baseline reports revealed an elevated ESR and CRP, along with increased eosinophil count and serum IgE level. The baseline parameters were normal. All the inflammatory biomarkers were reduced after PRP. Clinical examination revealed marked improvement in the rash on her second visit. Furthermore, after the second therapy, the patient reported marked control on itchiness and disappearance of rash. She was quite satisfied with the treatment.

Conclusion: This study suggests that use of platelet-rich plasma has beneficial effects on skin disorders which can be attributed to various platelet-derived growth factors causing improvement. It is safe, cheap, and non-allergic and appears to be a useful adjuvant in the management of eczema.

Keywords: Atopic dermatitis; Eczema; Platelet rich plasma preparation,

INTRODUCTION

Platelet rich plasma (PRP) has been utilized in a variety of fields for over four decades. Despite the premise of improved wound healing, secondary to growth factor release, PRP has not witnessed widespread popularity in aesthetic practice.(1)

The concept of using a patient's own blood or components thereof (autologous) to enhance the physiological process of healing has been in place for many years. (2) PRP injection is a therapeutic approach in which the tools of biological regeneration of autologous cells and tissue are used, rather than their replacement. Platelet-rich plasma is cell-free plasma with a concentrated level of platelets above baseline, obtained from the patient's own blood.(3).

Platelet-rich plasma has become an increasingly used treatment in the field of sports medicine, wound healing, and orthopedic. The use of autologous blood products as an adjunct to treatment was first pioneered in cardiovascular surgery and wound-healing applications.(4,5&6). Oromaxillofacial surgeons then adopted its use, followed by the adoption in both animal and human musculoskeletal applications.

Platelet-rich plasma is also known as platelet rich growth factors (GFs), platelet-rich fibrin (PRF) matrix, PRF, and platelet concentrate. The concept and description of PRP started in the field of hematology (*7*). Hematologists created the term PRP in the 1970s in order to describe the plasma with a platelet count above that of peripheral blood, which was initially used as a transfusion product to treat patients with thrombocytopenia (8). Fibrin had the potential for adherence and homeostatic properties, and PRP with its anti-inflammatory characteristics stimulated cell proliferation (*9*).

Atopic dermatitis (AD, atopic eczema, eczema) is a catchall term for inflammation of the skin characterized by itchy, discolored, dry patches. It may present as small bumps that leak fluid and crust over, scaly or raw skin or a red, itchy rash that appears after touching something.

There are many types of dermatitis such as atopic, contact and seborrheic. Atopic dermatitis is the most common type, usually found in children and in conjunction with allergies, hay fever or asthma. There is no clear cause of dermatitis, though genetics and allergens may be factors. (*10*). In other words eczema is used to describe skin inflammation in general. Depending on the causes and the presentation of skin condition, it is further categorized into different types such as contact eczema, seborrheic eczema, nummular eczema etc. Atopic Dermatitis is a type of eczema and is considered to be one of the server types. Atopic Dermatitis

is considered to be a chronic condition and it has very limited treatment options. The exact cause of Atopic Dermatitis is still unknown; however, Atopic Dermatitis is usually associated with the genetic variation which reduces the skin's natural ability to protect itself from infections and irritants. Some other factors are also found to be aggravating the conditions such as contact allergies, digestive problems, nutritional deficiency, stress, food intolerance, and immune system problems. There is a condition primarily affecting allergy-prone people, specifically heat, humidity, detergents/soaps, abrasive clothing (eg, very scratchy wools), chemicals, smoke, as well as stress may trigger eczema. While scratching it increases the chances of developing a superimposed infection because it produces breaks in the skin.The most common locations for eczema include the face, neck, in front of the elbows, behind the knees, and on the extremities. Adults with eczema may notice the most irritation on the arms and legs, particularly in front of the elbows and behind the knees.

The management for exacerbated AD is a therapeutic challenge, as it requires efficient short-term control of acute symptoms, without compromising the overall management plan that is aimed at long-term stabilization, flare prevention, and avoidance of side effects. If the disease management is observed it is considered as less than 10% are regarded as severe cases, because of disease intensity and extent (SCORAD > 40) or refractory to treatment. Reasons for severe courses of AD are based on individual (e.g. genetic, barrier function, allergies) risk factors and sometimes on therapeutic problems like misunderstandings with regard to topical treatment. It may sometimes uncover relevant provocation factors, for example contact allergy, or infection. (11).

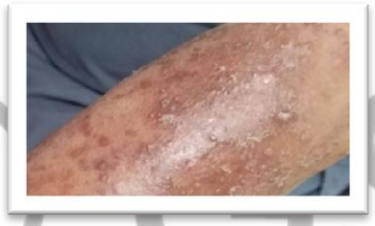
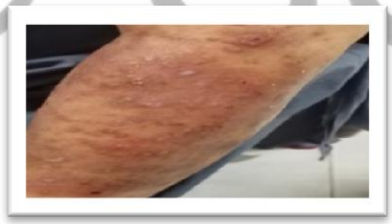
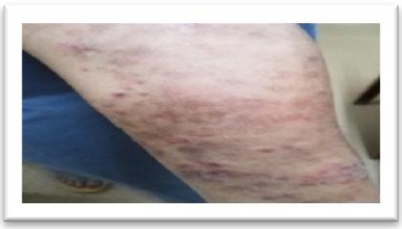
The aim of this case study is to: (1) describe the current uses of PRP in atopic dermatitis; (2) identify reported techniques of preparation and mechanisms of activation; (3) explore the evidence of effectiveness; and (4) propose a classification system to facilitate meaningful comparisons across clinical studies

CASE REPORT 1:

A 30-year-old lady, working as a housekeeping staff at a private hospital situated in Karachi, Pakistan. On revealing, the history it was noted that there was swelling and redness of her cheeks for the past 3 years. Since last 6 months she developed a skin rash bilaterally in her elbow, upper arm and forearm. The rash was associated with itching and burning sensation. Further she

complained about redness and itchy skin on forehead, around eyes, face, neck and upper chest areas. The treatment which was given to her was using the antifungal tablet and cream.
On examination there was swollen, redness with small pustules all over the forearm skin.
Before entering the clinical trial the baseline investigation were carried out. 15 cc blood sample was collected for PRP and for baseline investigation. The platelet rich plasma (PRP) was collected with the help of spiral needle in sterilized falcon tube which was then placed in Adilight 2 for the activation of PRP for 15 minutes. The clinical trial was performed for 4 weeks which is summarized in figure 1.

Figure 1.

CASE 1		
Days	*Response of Eczema to PRP*	*Biomarkers*
1		Eosin = 14% ESR = 78 CRP =14.7 IgE = 320
15		Eosin = 08% ESR = 60 CRP = 9.6 IgE = 285
30		Eosin = 02% ESR = 45 CRP = 3.2 IgE = 145

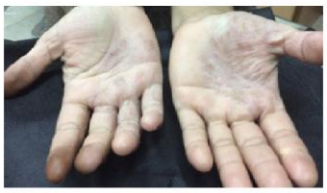
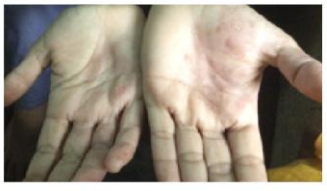
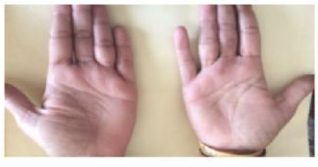
Note: ESR, mm in 1st hr; CRP, mg/L; IgE, IU/mL
Abbreviations: Eosin, eosinophil; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; IgE, immunoglobulin E

CASE REPORT 2:

A 25 year-young girl, working in the house and used to stay in a bungalow for 24 hours in Karachi, Pakistan. On revealing, the history it was noted that she was complaining for the fever and vomiting, for which she was taking to the general physician. On revealing the history it was it was reported that she has been having this eczema since last 3 years and she takes medicine and gets well for a week and on leaving the medicine the eczema increases more. The general physician reported that due to wrong medicine there is a inflammation on the liver for that reason she is having nausea and vomiting. When she was taken to skin hospital on examination it was diagnosed as eczema was given steroids for treating eczema. After consultation the patient's decided to go for the PRP treatment.

Before entering the clinical trial the baseline investigation were carried out. 15 cc blood sample was collected for PRP and for baseline investigation. The platelet rich plasma (PRP) was collected with the help of spiral needle in sterilized falcon tube which was then placed in Adilight 2 for the activation of PRP for 15 minutes. The clinical trial was performed for 4 weeks which is summarized in figure 2.

Figure 2

CASE 2		
Days	*Response of Eczema to PRP*	*Biomarkers*
1		Eosin = 31% ESR = 82 CRP =36.9 IgE = 411
15		Eosin = 22% ESR = 55 CRP = 13.4 IgE = 299
30		Eosin = 03% ESR = 25 CRP = 4.4 IgE = 114

Note: ESR, mm in 1st hr; CRP, mg/L; IgE, IU/mL
Abbreviations: Eosin, eosinophil; ESR, erythrocyte sedimentation rate; CRP,
C-reactive protein; IgE, immunoglobulin E

DISCUSSION:

Usually, Atopic Dermatitis is seen first in very young children up to the age of five, and it may fade away as the child matures. But in our present case, the guest is still suffering from the irritating rashes and itchy skin. So, identifying triggers which cause the skin problems and addressing them can be the best treatment.

Physiologically, platelets function as hemostatic agents, adhering to areas devoid of endothelium to form a platelet plug that seals the vessel wall. Platelet adhesion triggers their activation, with subsequent degranulation, and release of granule content. The basic quality for which platelet injections are used in clinical medicine is this well-known release reaction that follows their activation. In this reaction, large quantities of bioactive molecules are released, and are capable of modifying cellular proliferation, differentiation, matrix remodeling, and angiogenesis, enhancing wound healing, and tissue regeneration.(12) The key component of the platelet that are thought to be particularly influential in this regard the α-granule, which contains prepackaged growth factors. Thus PRP applications attempt to profit from this large milieu of growth factors and chemokines, with their biological activity as shown in table 1. (13,14 & 15)

Table 1.

Growth Factors	Biological Actions
Platelet derived growth factor (PDGF	Mitogenetic for fibroblasts, smooth muscle cells, mesenchymal stem cells, and osteoblasts ;Stimulation of macrophage and neutrophil chemotaxis; activation of macrophages
Transforming growth factor (TGF α/β)	Extracellular matrix synthesis; Keratinocyte regulation in reepithelization; Stimulation of angiogenesis Stimulation of type I and type III collagen production; Stimulation fibroblasts and mesenchymal stem cells proliferation
Vascular endothelial growth factor (VEGF	Stimulation of angiogenesis Chemotactic for endothelial cells Mitogenic for endothelial cells and keratinocytes
Epidermal growth factor (EGF)	Stimulation of epithelial/mesenchymal mitogenesis;Stimulation of chemotaxis of keratinocytes; Stimulation of endothelial chemotaxis, mitogenesis and angiogenesis;Regulation of the secretion of collagenase
Fibroblast growth factor (FGF)	Promotion of angiogenesis, endothelial and fibroblast proliferation and migration, fibronectin synthesis and secretion
Connective tissue growth factor (CTGF	Regulation of collagen synthesis; Enhancement of platelet adhesion Stimulation of white blood cell migration;Promotion of angiogenesis

There have been also been exciting developments made in the field of Regenerative Medicine. This includes the use of PRP (platelet-rich plasma) and stem cells to help build healthy discs, tendons, cartilage, ligaments, skin, wound healing and bone. PRP, for example, is being used to treat injured or degenerative discs, joints, or soft tissues such as tendons.(16)

PRP is highly beneficial for increasing collagen production, skin tightening, connective tissue regeneration, and skin thickness rejuvenation. PRP for Skin Rejuvenation Treatment Therapy is ideal for any wrinkling or sagging in the forehead, eye, chin, cheek, neck, or chest areas, and for the hands. PRP's growth factors activate cells in the body to prepare for the healing and generation of new capillaries and collagen in the skin. By increasing one's collagen production, results are compounded and improvements continue to occur over time as the body rebuilds its collagen supply.

The PRP treatment is simple, minimally invasive treatment that can be complered within an hour and PRP is then injected into the areas of concern to begin the regeneration of the skin and smooth out wrinkles. It can be administered to as many areas as desired. The result is wrinkles, dryness, roughness, loss of laxity and pigmentation. Growth factors have the ability to induce the synthesis of collagen and other matrix components by activating fibroblasts, therefore reversing skin damage and ageing. (17*)*

Conclusion:

Platelet rich plasma represents a biological therapy that restarts and accelerates the healing process of chronic ulcers recalcitrant to other treatments, providing an improvement of patient quality of life.

Having the advantages of biocompatible safety, low cost, simple preparation and clinical effectiveness more clinical randomized controlled trials should focus on the use of platelet rich plasma as an adjuvant therapy in the management of chronic wounds and in discovering various conditions in which its use has merit. This study also suggests the use of platelet-rich plasma has a beneficial effects on skin diseases and can thus be attributed to various platelet-derived growth factors causing improvement in the function on skin and promotion to decreases the rashes and itching. It is safe, cheap, and non-allergic and it appears to be a useful adjuvant in the management of eczema.

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