



Benefits of using PRP Therapy in Various Gynecological Diseases

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Received 6th Oct 2022,
Accepted 5th Nov 2022,
Online 14th Dec 2022

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Abstract: Platelet rich plasma is autologous blood, containing high levels of growth and anti-inflammatory factors. This method is widely used and proven in various fields of modern medicine, including plastic surgery, sports medicine, tendon and ligament injuries, traumatology, dermatology, and gynecological diseases. A healthy organism has the ability to overcome small injuries independently, because the regeneration process is actively carried out under physiological conditions. When there is contact with pathogenic organisms, in cases of blood circulation disorders, hormonal changes, due to deficiencies in the immune system, the recovery process slows down and loses its activity. In such cases, using the platelet rich plasma (PRP) accelerates the recovery process due to its high anti-inflammatory effectiveness and growth factors.

Key words: growth factors, gynecologic diseases, inflammation, ovarian reserve, regeneration, PRP-therapy.

Introduction. PRP is an autologous biological material taken from the patient's blood, it contains 2/3 times more platelets compared to the norm, and growth factors bound to platelets are also found in high concentration. The concept of PRP first emerged in the field of hematology in the 1970s to treat patients with thrombocytopenia. In the 1980s and 1990s, it began to be used in the fields of maxillofacial surgery and plastic surgery. Since then, PRP is used in orthopedic practices, cardiosurgery, sports injuries, gynecology, urology and medical aesthetics. PRP has a higher concentration of platelets than normal plasma (about $150-400 \times 10^3$ cells/L). Platelets release several growth factors and cytokines that are associated with the healing and regeneration process.

Platelets contain more than 1100 different proteins and 1500 protein-based bioactive factors as the main component of PRP. These factors include growth factors, enzymes, and their inhibitors, and several factors involved in tissue regeneration and repair. Another important aspect of PRP is that it does not cause any immune reaction because it is taken from the patient's own blood. This increases the efficiency and possibility of its wide application in practice. Thrombocytes are usually associated with their primary function in hemostasis and coagulation. Namely, after injury with resulted bleeding, thrombocytes are activated and start to release their granules filled with growth factors which finally

stimulate the inflammatory cascade and healing process. Also, they are involved in removing the debris from damaged tissue and removing the infectious agents.

Table 1. Growth factors in PRP and their biological functions

Name	Function
Platelet derived growth factor	Enhances collagen synthesis, proliferation of bone cells, fibroblast chemotaxis and proliferative activity, macrophage activation
Transforming growth factor β	Enhances synthesis of type I collagen, promotes angiogenesis, stimulates chemotaxis of immune cells, inhibits osteoclast formation and bone resorption
Vascular endothelial growth factor	Stimulates angiogenesis, migration and mitosis of endothelial cells, increases permeability of the vessels, stimulates chemotaxis of macrophages and neutrophils
Epidermal growth factor	Stimulates cellular proliferation, differentiation of epithelial cells, promotes cytokine secretion by mesenchymal and epithelial cells
Insulin-like growth factor	Promotes cell growth, differentiation, recruitment in bone, blood vessel, skin and other tissues, stimulates collagen synthesis together with PDGF
Fibroblast growth factor	Promotes proliferation of mesenchymal cells, chondrocytes and osteoblasts, stimulates the growth and differentiation of chondrocytes and osteoblasts

Materials and results. PRP therapy is widely used in various gynecological diseases. Yogita Dogra, Neeta Singh conducted a prospective study on women with endometrial thickness <7 mm, and they performed PRP therapy 26 times in 2018-2020. In these women, the frequency of implantation, the frequency of clinical pregnancy, and the frequency of live births were evaluated. According to the results, the thickness of the endometrium increased by 1.07 and 0.83 mm after the 1st PRP procedure. According to the conclusions of the inspection, it was known that all indicators increased by 20-25%.

Scientists Kelton Tremellen and Leanne Pacella-Ince conducted a cohort study of patients over 45 years of age with low ovarian reserve and a history of ineffective IVF. According to the results of the investigation, obtaining embryos with a high quality of life after the PRP procedure showed a twice as high result as compared to the usual method for the IVF procedure. Ovarian PRP treatment appears to be of low risk and may offer some help in pregnancy (natural and IVF-related), especially in women with reduced oocyte quality due to advanced maternal age.

At the same time, Yigit Chakiruglu and co-authors conducted an examination on 311 women diagnosed with primary ovarian insufficiency based on ESHRE criteria between 20-40 years of age and analyzed the effect of platelet-rich autologous plasma on ovarian reserve and IVF practice results. During the examination, the number of antral follicles and the amount of AMH in the blood were monitored. After PRP treatment, spontaneous pregnancy occurred in 7.4% of women, and 64.8% underwent IVF due to the increase in the number of antral follicles. The amount of AMH in the blood plasma was significantly increased, but there was no change in the amount of FSH.

In 2021, Anastasia Prodromidou and a number of scientists investigated the effectiveness of autologous plasma therapy in diseases of the pelvic organs. According to their conclusions, PRP therapy improved the clinical course of women suffering from vaginal atrophy who had contraindications to hormonal therapy, and significantly reduced the frequency of urinary incontinence in patients with pelvic organ prolapse.

Conclusion. PRP represents important therapy in regenerative medicine. Beside platelets, as a dominant PRP factor, other bioactive factors may be involved in modulation of immune response, by removing the potential microbes and stimulating growth factor release. Despite the fact that autologous plasma therapy rich in platelets has been used since the last century and its effectiveness has been proven in many fields of medicine, the relevance of conducting many more randomized examinations in this field remains high.

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