ISSN: 2692-5206
AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

USING PRP IN THE TREATMENT OF ORTHOPEDIC DISEASES

Kenjayev Sherzod Ravshan ugli

Assistant Department of Traumatology and Orthopedics,

Fergana Institute of Public Health

Saidov Komiljon Kamoliddin ugli

5th year student, Fergana Institute of Public Health

Abstract: Platelet-rich plasma (PRP) therapy has emerged as a promising regenerative treatment in orthopedics due to its potential to accelerate tissue healing and reduce inflammation. PRP is an autologous concentration of platelets in a small volume of plasma, rich in growth factors that stimulate cell proliferation, angiogenesis, and tissue regeneration. This paper reviews the mechanisms of PRP action, preparation methods, and its clinical applications in the management of various orthopedic conditions, including osteoarthritis, tendinopathies, and ligament injuries. The safety profile, benefits, and limitations of PRP therapy are also discussed.

Keywords: platelet-rich plasma, PRP therapy, orthopedic diseases, regenerative medicine, tendinopathy, osteoarthritis, growth factors, musculoskeletal injuries.

Orthopedic diseases, such as osteoarthritis, tendon injuries, and ligamentous damage, are prevalent conditions that impair mobility and quality of life. Conventional treatments often focus on symptom management rather than tissue regeneration. In recent years, regenerative therapies have gained attention, particularly platelet-rich plasma (PRP), which harnesses the body's own healing potential. PRP therapy involves injecting a concentration of a patient's own platelets to enhance the natural healing process. This introduction sets the stage for discussing the science, application, and outcomes of PRP in orthopedic medicine.

Platelet-rich plasma (PRP) is an autologous concentration of platelets in plasma, obtained from the patient's own blood. While platelets are primarily known for their role in blood clotting, they also contain a rich supply of bioactive molecules that play a critical role in tissue repair and regeneration. When activated, platelets release various growth factors and cytokines stored in their alpha granules, which initiate and regulate biological processes such as cell migration, proliferation, differentiation, and angiogenesis.

The most important growth factors found in PRP include platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), insulin-like growth factor-1 (IGF-1), and fibroblast growth factor (FGF). PDGF stimulates cell growth and angiogenesis, while TGF-β is involved in extracellular matrix production and inflammation regulation. VEGF plays a key role in the formation of new blood vessels, which is vital for tissue repair. EGF and IGF-1 support cell proliferation and tissue remodeling, and FGF promotes the proliferation of fibroblasts and endothelial cells. Together, these factors orchestrate a complex healing response at the site of injury.

ISSN: 2692-5206
AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

The preparation of platelet-rich plasma (PRP) involves the collection and processing of autologous blood to concentrate platelets and associated growth factors. Despite the widespread use of PRP in clinical practice, there is currently no universal standard for its preparation. The methods can vary significantly depending on the technique used, the desired platelet concentration, and the clinical application.

The general process begins with the collection of a small volume of the patient's peripheral blood, typically between 10 to 60 milliliters, using an anticoagulant such as citrate to prevent clotting. The blood is then subjected to centrifugation, a process that separates the blood components based on their density. Most protocols involve either a single-spin or double-spin centrifugation method.

In the single-spin method, blood is centrifuged once to separate red blood cells (RBCs) from plasma. This results in a plasma layer containing platelets and some white blood cells. In the double-spin method, the plasma layer from the first centrifugation is spun again to further concentrate the platelets, allowing the removal of platelet-poor plasma and isolation of the platelet-rich fraction. The double-spin method generally yields a higher concentration of platelets and is commonly used in musculoskeletal applications.

The final PRP product may be classified based on its composition. It can be either leukocyte-rich PRP (L-PRP), which includes white blood cells and is believed to enhance the inflammatory response useful in some injuries, or pure PRP (P-PRP), which has minimal leukocytes and is preferred in intra-articular treatments to reduce inflammation. In some procedures, platelet-rich fibrin (PRF) is prepared without anticoagulants and forms a natural fibrin matrix that releases growth factors over a longer period.

After preparation, PRP can be activated to stimulate degranulation of platelets and release of growth factors. This is typically achieved by adding calcium chloride, thrombin, or through exposure to collagen or mechanical stress at the injection site. Activation is not always necessary, as endogenous factors at the injury site can also trigger platelet activation.

The variability in preparation methods—such as centrifugation speed and time, inclusion or exclusion of leukocytes, and activation protocols—can lead to significant differences in PRP composition and therapeutic efficacy. Therefore, standardization of PRP preparation remains an important goal for improving its clinical outcomes and reproducibility.

Conclusion

PRP therapy represents a promising approach in the treatment of orthopedic conditions by promoting natural tissue healing and reducing inflammation. Although current evidence supports its use in certain indications, further high-quality randomized controlled trials are needed to establish standardized protocols, optimize patient selection, and confirm long-term efficacy. As research advances, PRP may become a mainstay in regenerative orthopedic treatments.

References

ISSN: 2692-5206
AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

1. Marx, R. E. (2004). Platelet-rich plasma (PRP): what is PRP and what is not PRP? *Implant Dentistry*, 10(4), 225–228.
2. Mishra, A., & Pavelko, T. (2006). Treatment of chronic elbow tendinosis with buffered platelet-rich plasma. *American Journal of Sports Medicine*, 34(11), 1774–1778.
3. Dohan Ehrenfest, D. M., Rasmusson, L., & Albrektsson, T. (2009). Classification of platelet concentrates: from pure platelet-rich plasma (P-PRP) to leukocyte- and platelet-rich fibrin (L-PRF). *Trends in Biotechnology*, 27(3), 158–167.
4. Foster, T. E., Puskas, B. L., Mandelbaum, B. R., Gerhardt, M. B., & Rodeo, S. A. (2009). Platelet-rich plasma: from basic science to clinical applications. *American Journal of Sports Medicine*, 37(11), 2259–2272.
5. Boswell, S. G., Cole, B. J., Sundman, E. A., Karas, V., & Fortier, L. A. (2012). Platelet-rich plasma: a milieu of bioactive factors. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, 28(3), 429–439.
6. Anitua, E., Sánchez, M., Orive, G., & Andía, I. (2007). The potential impact of the preparation rich in growth factors (PRGF) in different medical fields. *Biomaterials*, 28(31), 4551–4560.