Volume 3 - Issue 9– September,2023
SABUJEEMA
An International Multidisciplinary e-Magazine

SCOPE OF PLATELET RICH PLASMA IN VETERINARY OPHTHALMOLOGY

[Article ID: SIMM0298]

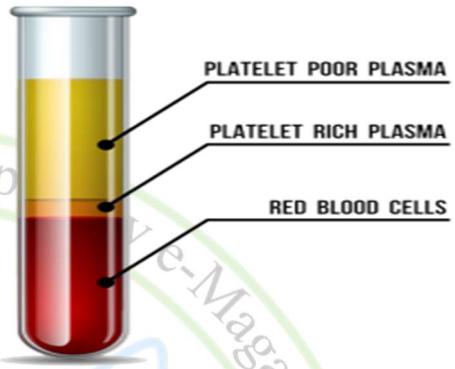
Mimi Lalhmangaihzuali, Leibaknganbi Maibam and Suvendu Kumar Behera

Department of Veterinary Medicine, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih-796 015, Aizawl, Mizoram

Abstract

Blood derived products have demonstrated their capacity to enhance healing and stimulate the regeneration of different tissues and this enhancing effect is attributed to the growth factors and bioactive proteins that are synthesized and present in blood (Anitua *et al*., 2004). Different blood derived formulations, such as autologous serum, plasma enriched with platelets and preparations rich in growth factors have been used to promote wound healing in multiple tissues.

Whole blood contains a liquid portion called plasma, as well as solid components – Red Blood Cells (RBCs), White Blood Cells (WBCs) and platelets. Although the major role of platelets is the formation of blood clot, they also contain hundreds of proteins called growth factors and cytokines that play an important role in the healing of injuries. Platelet-rich plasma (PRP), also known as autologous conditioned plasma, is a concentrate of platelet-rich plasma protein derived from whole blood, centrifuged to remove RBCs (Collins *et al*., 2021). The concentration of platelets and growth factors in PRP can be 5 to 10 times greater (or richer) than normal platelets.



Owing to its ability to stimulate healing of soft tissues and joints, PRP has been proposed to treat inflammatory conditions that affect ligaments, muscles, and tendons, such as osteoarthritis, in the treatment of bone fracture, skin wounds and dental diseases in human. In the recent decades, there has been a significant rise in the use of Eye Platelet Rich Plasma (E-PRP) as a better alternative for ophthalmologic therapies primarily of the ocular surface. Based on the data from *in vitro* and *in vivo* studies, it has been shown that E-PRP possesses adequate therapeutic potential in ocular pathologies, especially those involving cornea. In addition, the high concentrations of growth factors (TGF-β, VEGF, EGF) present in the PRP accelerate the healing of the corneal epithelium (Sharun *et al*., 2023).

PRP has great therapeutic prospects in veterinary ophthalmology as a regenerative therapeutic modality (Sharun *et al*., 2023). It has been found that PRP causes the regeneration of deep and extensive corneal ulcers, escalates epithelial wound healing and has shown beneficial effects in cornea healing in animals with no adverse effects

(Piso *et al*., 2023). Three forms of PRP therapy can be applied to the ocular surface:

1. **Drop Form:** The ocular surface is treated using topical autologous PRP drops (Alio *et al*., 2017).
2. **Injectable Form:** The PRP is injected via the subconjunctival or intrastromal route (Farghali *et al*., 2021).
3. **Clot Form:** Platelet-rich clot is used to make sure that the platelets and growth factors are retained. Afterward, the eye is covered with the third eyelid (Merlini *et al*., 2014).

The PRP drops were found to promote the healing process of moderate or grade II corneal ulcers in dogs and prevent their advancement to aggressive forms of ulcers . Autologous PRP is reported to be effective in dogs suffering from moderate keratoconjunctivitis sicca and for the management of inflammatory or traumatic conditions of the anterior ocular surface. Subconjunctival injection of autologous PRP is effective in treating corneal ulcers in dogs. Autologous PRP is also used as adjunctive therapy along with diamond-burr debridement for managing spontaneous chronic corneal epithelial defects in canines. E-PRP eye drop application improves regeneration of the ocular surface and relieves symptoms in patients with symptomatic dry eye, with no adverse events with a follow-up of up to 6 months (Alio *et al*., 2011). Since autologous E-PRP is a preservative-free biological product obtained directly from the patient's own blood, it has notable advantages over topical steroids, whose long-term usage may result in side effects such as an increased risk of infection, intraocular pressure elevation and cataract formation. The combination of intrastromal PRP and oral doxycycline therapy was found effective in managing ocular emergencies, such as corneal chemical burns (alkali burn) (Charalambidou *et al*., 2019). Due to the protective activity, PRP can be routinely used after surgical interventions on the cornea as supportive therapy (Vatnikov *et al*., 2020).

By virtue of its bioactive growth factors, its similarity with natural tears and its highly regenerative power, PRP can be used safely and effectively in the treatment of ocular diseases. It shortens the course of treatment in ocular diseases and offers promising results. It has several advantages in the case of ocular diseases; therefore, its applicability should be increased in ocular diseases.

REFERENCES

1. Alio, J.L., Rodriguez, A.E., Abdelghany, A.A. and Oliveira, R.F. (2012). The role of "eye platelet rich plasma" (E-PRP) for wound healing in ophthalmology. *Current pharmaceutical biotechnology*, 13(7): 1257-1265.
2. Anitua, E., Andia, I., Ardanza, B., Nurden, P., & Nurden, A. T. (2004). Autologous platelets as a source of proteins for healing and tissue regeneration. *Thrombosis and haemostasis*, 91(01): 4-15.
3. Charalambidou, G., Kofidou, E., Papaioannou, N., Karampatakis, V., & Komnenou, A. (2018). The effect of intrastromal PRP and oral doxycycline in corneal wound healing after alkali burn. *Journal of the Hellenic Veterinary Medical Society*, 69(4): 1213-1226.
4. Collins, T., Alexander, D., & Barkatali, B. (2021). Platelet-rich plasma: a narrative review. *EFORT open reviews*, 6(4): 225-235.
5. Farghali, H. A., AbdElKader, N. A., AbuBakr, H. O., Ramadan, E. S., Khattab, M. S., Salem, N. Y., & Emam, I. A. (2021). Corneal ulcer in dogs and

cats: novel clinical application of regenerative therapy using subconjunctival injection of autologous platelet-rich plasma. *Frontiers in Veterinary Science*, 8: 641265.

6. Merlini, N. B., Fonzar, J. F., Perches, C. S., Sereno, M. G., Souza, V. L. D., Estanislau, C. A. & Brandão, C. V. S. (2014). Uso de plasma rico em plaquetas em úlceras de córnea em cães. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, *66*, 1742-1750.
7. Piso, D.Y.T., Barreto, M.Y.P., Bonilla, M.P.S., Rincón, A.C., Páez, O.L.A., Rengifo, C.A. and Andrade, A.L. (2023). Effects of platelet-rich plasma on corneal re-epithelization and metalloproteinase expression in the cornea of sheep with experimentally-induced infectious keratoconjunctivitis. *Vet. World.*, 16(4): 799–810.
8. Sharun, K., Chandran, D., Manjusha, K. M., Mankuzhy, P. D., Kumar, R., Pawde, A. M. and Amarpal (2023). Advances and prospects of platelet-rich plasma therapy in veterinary ophthalmology. *Veterinary Research Communications*, 1-15.
9. Vatnikov, Y. A., Erin, I. S., Suleimanov, S. M., Kulikov, E. V., Seleznev, S. B., Lutsay, V. I. & Vilkovysky, I. F. (2020). Effect of autologous plasma treatment on the cornea regeneration with keratoconjunctivitis sicca in dogs. *J. Anim. Health Prod*, 8(1): 1-7.