DOI: 10.22055/ivj.2025.536469.2822

The effect of platelet-rich plasma (PRP) on blood glucose, inflammatory cytokines, and wound healing in diabetic rats

Maryam Babaei[1], Masoud Alirezaei[2], Moein Yazdkhasti[3*] and Ghasem farjanikish[4]

[1] DVM Graduated, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran
[2] Associate Professor, Department of Basic Sciences Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran
[3] Assistant Professor, Department of Clinical Sciences, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran
[4] Associate Professor, Department of Pathobiology, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran

Received: 23.07.2025 Accepted: 15.10.2025

Abstract

Diabetes mellitus is one of the most common metabolic disorders, characterized not only by persistent hyperglycemia but also by enhanced oxidative stress and inflammatory responses. Among proinflammatory cytokines, tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6) play central roles in impairing insulin signaling, promoting lipolysis and gluconeogenesis, and exacerbating metabolic dysfunction. Platelet-rich plasma (PRP), enriched with growth factors and regulatory cytokines, has recently gained attention as a potential therapeutic strategy for tissue regeneration and inflammation control. In this study, diabetes was induced in Wistar rats using streptozotocin (65 mg/kg.), and full-thickness excisional wounds (2 cm) were created on the dorsum. The treatment group received daily topical applications of autologous PRP (50 U; 1 mL/kg body weight) from day 6 to day 20. Blood glucose was monitored at defined intervals, and serum IL-6 and TNF-α levels were measured using ELISA. PRP treatment significantly reduced blood glucose levels, particularly on days 3 and 21 of intervention. Moreover, TNF-α and IL-6, two pivotal cytokines involved in systemic inflammation, were markedly decreased in the PRP-treated diabetic group compared with untreated diabetic controls. The findings provide clear experimental evidence for the dual antihyperglycemic and anti-inflammatory properties of PRP in diabetes. By downregulating IL-6 and TNF-α, PRP not only improves glucose metabolism but also alleviates inflammatory responses, underscoring its potential as a novel adjunctive therapy for metabolic and inflammatory complications of diabetes

Key words: Diabetes mellitus, Inflammatory factors, glucose, PRP, Rat

[*] **Corresponding Author**: Moein Yazdkhasti, Assistant Professor, Department of Clinical Sciences, Faculty of Veterinary Medicine, Lorestan University, Khorramabad, Iran
E-mail: yazdkhasti.m@lu.ac.ir

Refrences

Agale, S. V. (2013). Chronic leg ulcers: epidemiology, aetiopathogenesis, and management. *Ulcers*, *2013*(1), 413604.

Ahmed, M., Reffat, S. A., Hassan, A., & Eskander, F. (2017). Platelet-rich plasma for the treatment of clean diabetic foot ulcers. *Annals of vascular surgery*, *38*, 206-211.

sArnoczky, S. P., Delos, D., & Rodeo, S. A. (2011). What is platelet-rich plasma? *Operative techniques in sports Medicine*, *19*(3), 142-148.

Blair, M. (2016). Diabetes mellitus review. *Urologic nursing*, *36*(1).

Cao, Z., Liu, Y., Wang, Y., & Leng, P. (2023). Research progress on the role of PDGF/PDGFR in type 2 diabetes. *Biomed Pharmacother*, *164*, 114983, doi: 10.1016/j.biopha.2023.114983

Everts, P., Onishi, K., Jayaram, P., Lana, J. F., & Mautner, K. (2020). Platelet-Rich Plasma: New Performance Understandings and Therapeutic Considerations in 2020. *Int J Mol Sci*, *21*(20), doi: 10.3390/ijms21207794

Gong, F., Zhang, Y., Gao, J., Li, X., Zhang, H., Ma, G., Huang, Y., Zhang, B., & Zhao, F. (2023). RETRACTED: Effect of platelet-rich plasma vs standard management for the treatment of diabetic foot ulcer wounds: A meta-analysis. *International wound journal*, *20*(1), 155-163.

González, P., Lozano, P., Ros, G., & Solano, F. (2023). Hyperglycemia and Oxidative Stress: An Integral, Updated and Critical Overview of Their Metabolic Interconnections. *Int J Mol Sci*, *24*(11), doi: 10.3390/ijms24119352

Isbary, G., Morfill, G., Schmidt, H., Georgi, M., Ramrath, K., Heinlin, J., Karrer, S., Landthaler, M., Shimizu, T., & Steffes, B. (2010). A first prospective randomized controlled trial to decrease bacterial load using cold atmospheric argon plasma on chronic wounds in patients. *British Journal of Dermatology*, *163*(1), 78-82.

Kaul, K., Tarr, J. M., Ahmad, S. I., Kohner, E. M., & Chibber, R. (2013). Introduction to diabetes mellitus. *Diabetes: an old disease, a new insight*, 1-11.

Kucuk, L., Gunay, H., Erbas, O., Kucuk, U., Atamaz, F., & Coskunol, E. (2014). Effects of platelet-rich plasma on nerve regeneration in a rat model. *Acta orthopaedica et traumatologica turcica*, *48*(4), 449-454.

Lin ZQ, K. T., Ishida Y, Takayasu T, Mukaida N. (2020). Essential involvement of IL-6 in the skin wound-healing process as evidenced by delayed wound healing in IL-6-deficient mice *Journal of Leukocyte Biology,*, *73*(6), 713-721. doi: 10.1189/jlb.0802397

Marx, R. E. (2004). Platelet-rich plasma: evidence to support its use. *Journal of oral and maxillofacial surgery*, *62*(4), 489-496.

Menchisheva, Y., Mirzakulova, U., & Yui, R. (2019). Use of platelet-rich plasma to facilitate wound healing. *Int Wound J*, *16*(2), 343-353, doi: 10.1111/iwj.13034. 10.1111/iwj.13034

Weinberg Sibony, R., Segev, O., Dor, S., & Raz, I. (2024). Overview of oxidative stress and inflammation in diabetes. *Journal of diabetes*, *16*(10), e70014.

Wszola, M., Klak, M., Kosowska, A., Tymicki, G., Berman, A., Adamiok-Ostrowska, A., Olkowska-Truchanowicz, J., Uhrynowska-Tyszkiewicz, I., & Kaminski, A. (2021). Streptozotocin-induced diabetes in a mouse model (BALB/c) is not an effective model for research on transplantation procedures in the treatment of type 1 diabetes. *Biomedicines*, *9*(12), 1790.

Zheng, S. Y., Wan, X. X., Kambey, P. A., Luo, Y., Hu, X. M., Liu, Y. F., Shan, J. Q., Chen, Y. W., & Xiong, K. (2023). Therapeutic role of growth factors in treating diabetic wound. *World J Diabetes*,*14*(4),364-395,doi: 10.4239/wjd.v14.i4.364