BALNEO RESEARCH Balneo and PRM Research Journal English Edition
e ISSN 2734 - 8458 p ISSN 2734 - 844X ROMANIAN ASSOCIATION OF BALNEOLOGY

Research article

Conventional Physiotherapy versus Platelet-Rich Plasma in Postoperative Tissue Healing and Functional Rehabilitation

Mircea-Ioan Șandor [1,2], Cornel Dragos Cheregi [1,3,*], Mau Sebastian Horgos [1,4,*], Ruxandra-Florina Bodog [1,4], Ioana Ariana Borza [4], Carmen Anca Huniadi [1,5], Elena Costescu [6,*], Teodora Gabriela Alexescu [7] and Ioan Lucian Borza[8,3]

Citation: Șandor M.I., Cheregi C.D., Horgos M.S., Bodog R.F., Borza I.A., Huniadi C.A., Costescu E., Alexescu T.G., Borza I.L.. - Conventional Physiotherapy versus Platelet-Rich Plasma in Postoperative Tissue Healing and Functional Rehabilitation
Balneo and PRM Research Journal **2026**, *17(1): 957*

Academic Editor(s):
Constantin Munteanu

Reviewer Officer:
Viorela Bembea

Production Officer:
Camil Filimon

Received: 24.01.2026
Published: 31.03.2026

Reviewers:
Alin Ciubotaru
Corina Sporea

Publisher's Note: Balneo and PRM Research Journal stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

1 Department of Surgical Discipline, Faculty of Medicine and Pharmacy, University of Oradea, 1st December Square 10, 410073 Oradea, Romania;
2 CF Oradea Clinical Hospital, Str. Republic 56, 410159 Oradea, Romania;
3 Avram Iancu Military Hospital, Str. Dunarea 3, Oradea 410027, Romania;
4 Bihor City Emergency Clin Hosp, Gheorghe Doja St 57, Oradea 410169, Romania;
5 Pelican Clinical Hospital Oradea, Str. Corneliu Coposu nr.14A-14B, 410450 Oradea, Romania;
6 Preclinical Sciences Department, Faculty of Medicine, Apollonia University, 700511 Iasi, Romania;
7 Department of Internal Medicine, Faculty of Medicine and Pharmacy, UMF Iuliu Hațieganu Cluj Napoca Romania;
8 Department of Morphological Discipline, Faculty of Medicine and Pharmacy, University of Oradea, 1st December Square 10, 410073 Oradea, Romania

* Correspondence: mauhorgos@yahoo.com; cornel.cheregi@yahoo.com; naturaone@gmail.com

Abstract: Postoperative tissue healing and functional recovery are essential for optimal surgical outcomes, particularly in musculoskeletal and soft tissue procedures. Conventional physiotherapy is the cornerstone of postoperative rehabilitation, while platelet-rich plasma (PRP) has been proposed as a biological adjuvant to enhance tissue repair. However, comparative clinical data remain limited. This study aimed to compare conventional physiotherapy with PRP regarding postoperative tissue healing and functional rehabilitation. This prospective, non-randomized, comparative study included 80 adult patients undergoing elective soft tissue and/or musculoskeletal surgery. Patients were consecutively allocated to a conventional physiotherapy group (n = 40) or a PRP group (n = 40). The physiotherapy group followed a standardized rehabilitation program, while the PRP group received a single autologous PRP injection (3–5 mL, without exogenous activation) in the early postoperative period and basic mobilization guidance. Outcomes included pain intensity, range of motion of the operated lower extremity joint, time to functional recovery, and functional status assessed using the Lower Extremity Functional Scale (LEFS). The non-randomized study design and the difference in rehabilitation intensity between groups represent important limitations that may influence the observed outcomes. Randomized controlled trials with standardized intervention protocols are required to confirm these results. Baseline characteristics were comparable between groups. Both interventions led to clinical improvement; however, the PRP group showed greater pain reduction, higher LEFS scores, better range of motion, and a shorter time to functional recovery ($p < 0.05$ for all comparisons). No serious adverse events were observed. PRP was associated with faster pain relief and improved functional recovery compared with conventional physiotherapy alone. These findings support the potential role of PRP as an adjunct in postoperative rehabilitation.

Keywords: platelet-rich plasma, physiotherapy, postoperative rehabilitation, tissue healing, functional recovery, musculoskeletal surgery, pain management, LEFS

1. Introduction

Postoperative tissue healing is a complex biological and functional process that plays a decisive role in determining surgical outcomes. Delayed or inadequate healing may result in prolonged pain, impaired mobility, extended rehabilitation periods,

and reduced quality of life, ultimately increasing the burden on healthcare systems [1,2]. Despite advances in surgical techniques and perioperative management, optimizing postoperative recovery remains a major clinical challenge, particularly in musculoskeletal and soft tissue surgeries where both structural repair and functional restoration are required [3].

Conventional physiotherapy represents the cornerstone of postoperative rehabilitation and is widely implemented to restore joint mobility, muscle strength, neuromuscular coordination, and functional independence [4,5]. Standard physiotherapy protocols typically include therapeutic exercises, manual therapy, electrotherapy, and functional training, all aimed at preventing complications such as joint stiffness, muscle atrophy, and chronic functional limitations [6]. Although physiotherapy is effective in improving functional outcomes, its primary focus is mechanical and neuromuscular adaptation, with limited direct influence on the biological processes underlying tissue regeneration and repair [7].

In recent years, regenerative medicine approaches have gained increasing attention as potential adjuncts or alternatives to conventional rehabilitation strategies. Platelet-rich plasma (PRP), an autologous blood-derived product characterized by a high concentration of platelets and growth factors, has emerged as a promising therapeutic option for enhancing tissue healing [8,9]. PRP contains a complex array of bioactive molecules, including platelet-derived growth factor, transforming growth factor-β, vascular endothelial growth factor, and insulin-like growth factor, which are known to regulate angiogenesis, inflammation, collagen synthesis, and cellular proliferation [10–12]. Through these mechanisms, PRP may accelerate tissue repair and improve the quality of healing in postoperative settings.

Clinical applications of PRP have expanded across multiple surgical specialties, with studies reporting beneficial effects on wound healing, pain reduction, and functional recovery [13–15]. However, the clinical evidence remains heterogeneous, and the superiority of PRP over established rehabilitation approaches has not been consistently demonstrated. Differences in PRP preparation protocols, platelet concentrations, timing of administration, and outcome assessment contribute to variable results and limit the generalizability of existing findings [16,17].

Importantly, conventional physiotherapy and PRP target distinct but potentially complementary components of postoperative recovery. While physiotherapy focuses on restoring function through controlled mechanical loading and neuromuscular reeducation, PRP aims to modulate the biological healing environment at the tissue level [18]. A clear understanding of the relative effectiveness of these approaches is essential for developing optimized, evidence-based rehabilitation strategies tailored to individual patient needs.

Although conventional physiotherapy and platelet-rich plasma target distinct dimensions of postoperative recovery and may theoretically act synergistically, clinical decision-making often requires selecting a single primary strategy, particularly in settings where resource availability, patient preference, or medical indication limit combined interventions. In routine practice, PRP is sometimes administered as a biologically focused alternative when structured physiotherapy is not immediately feasible or when early biological modulation of healing is prioritized. Therefore, comparing these two approaches as distinct postoperative strategies allows a clearer evaluation of their independent contributions to tissue healing and functional recovery.

The aim of this study was to compare the independent effects of conventional physiotherapy and platelet-rich plasma as primary postoperative strategies on tissue healing and functional rehabilitation outcomes. By evaluating clinical recovery parameters and functional performance, this study seeks to clarify whether PRP provides additional benefits beyond standard physiotherapy and to define its potential role within comprehensive postoperative rehabilitation protocols. This study provides comparative clinical evidence supporting the role of platelet-rich plasma as an

adjuvant to conventional physiotherapy, highlighting its potential to accelerate tissue healing and functional recovery in the postoperative setting.

2. Results

2.1. Baseline Characteristics of the Study Population

A total of 80 patients were included in the analysis and evenly distributed between the two study groups: Group A (Conventional Physiotherapy, n = 40) and Group B (PRP, n = 40). Baseline demographic and clinical characteristics are summarized in Table 1.

The mean age of patients in the conventional physiotherapy group was 52.4 ± 9.6 years, compared with 51.1 ± 10.2 years in the PRP group, with no statistically significant difference between groups (p = 0.56). Gender distribution was comparable, with males accounting for 57.5% of patients in Group A and 55.0% in Group B (p = 0.82).

Baseline body mass index (BMI) did not differ significantly between groups (26.8 ± 3.9 kg/m² in Group A vs. 26.3 ± 4.1 kg/m² in Group B; p = 0.61). Preoperative pain intensity, assessed using the Visual Analog Scale (VAS), was similar in both groups (6.9 ± 1.1 vs. 7.1 ± 1.2, p = 0.48).

Functional status at baseline, evaluated using standardized functional assessment scores appropriate to the surgical site, showed no significant differences between groups (p > 0.05 for all comparisons). In addition, the distribution of surgical procedures and postoperative rehabilitation indications was comparable between the two groups, with no statistically significant imbalance.

Overall, no significant differences were identified between the conventional physiotherapy and PRP groups at baseline, indicating adequate comparability of the study populations prior to intervention.

Table 1. Baseline characteristics of the study population

Parameter	Conventional Physiotherapy (n = 40)	PRP Group (n = 40)	p-value
Age (years)	52.4 ± 9.6	51.1 ± 10.2	0.56
Sex (male), n (%)	23 (57.5%)	22 (55.0%)	0.82
BMI (kg/m²)	26.8 ± 3.9	26.3 ± 4.1	0.61
Preoperative VAS pain score	6.9 ± 1.1	7.1 ± 1.2	0.48
LEFS score	Comparable	Comparable	>0.05

[1] Data are presented as mean ± standard deviation or number (percentage). Comparisons between groups were performed using independent samples t-tests or chi-square tests, as appropriate. A p-value < 0.05 was considered statistically significant.

2.2.Clinical and Functional Outcomes

Postoperative clinical and functional outcomes were evaluated and compared between the two study groups at predefined follow-up time points. Patients treated with platelet-rich plasma demonstrated a more rapid improvement in several parameters of tissue healing and functional recovery than those undergoing conventional physiotherapy alone.

Pain intensity, assessed using the Visual Analog Scale (VAS), decreased significantly in both groups over the follow-up period. However, the pain reduction was more pronounced in the PRP group. At the first postoperative follow-up, mean VAS scores were 4.1 ± 1.0 in the conventional physiotherapy group and 3.2 ± 0.9 in the PRP group, with a statistically significant difference between groups (p = 0.001). At the final follow-up, VAS scores further decreased to 2.3 ± 0.8 in the physiotherapy group and 1.5 ± 0.6 in the PRP group (p < 0.001).

Functional recovery, evaluated using standardized functional assessment scores relevant to the surgical site, improved progressively in both groups. Patients in the

PRP group exhibited significantly higher LEFS scores at intermediate and final assessments. At the intermediate follow-up, LEFS scores reached 68.4 ± 9.2 in the physiotherapy group and 75.6 ± 8.7 in the PRP group ($p = 0.002$). At the final evaluation, mean LEFS scores were 78.9 ± 7.5 for the physiotherapy group and 86.3 ± 6.9 for the PRP group ($p < 0.001$). The between-group difference in LEFS scores at 12 weeks was approximately 7–8 points, approaching the minimal clinically important difference (MCID) of approximately 9 points reported in previous literature, suggesting a potentially meaningful functional benefit. Range of motion of the operated lower extremity joint also favored the PRP group, with significantly greater improvements observed at final follow-up. At the final follow-up, patients receiving PRP achieved 91.2% ± 6.4% of the expected normal range of motion, compared with 84.7% ± 7.1% in the physiotherapy group ($p = 0.004$).

Time to functional recovery, defined as the number of weeks required to resume daily activities without significant limitation, was shorter in the PRP group. Patients treated with PRP returned to functional independence after a mean of 6.8 ± 1.3 weeks, whereas those undergoing conventional physiotherapy required 8.1 ± 1.5 weeks ($p < 0.001$). The observed 1.3-week reduction in time to functional recovery may represent a clinically relevant acceleration of postoperative rehabilitation, particularly for patients requiring early return to daily activities or work.

These findings indicate that postoperative treatment with platelet-rich plasma was associated with faster pain reduction, improved functional outcomes, and accelerated recovery when compared with conventional physiotherapy alone.

A comparative overview of postoperative pain reduction, functional recovery, and rehabilitation outcomes between the two study groups is presented in Table 2.

Table 2. . Clinical and Functional Outcomes

Outcome Parameter	Conventional Physiotherapy (n = 40)	PRP Group (n = 40)	p-value
VAS pain score – early follow-up	4.1 ± 1.0	3.2 ± 0.9	0.001
VAS pain score – final follow-up	2.3 ± 0.8	1.5 ± 0.6	<0.001
LEFS score – intermediate follow-up	68.4 ± 9.2	75.6 ± 8.7	0.002
LEFS score – final follow-up	78.9 ± 7.5	86.3 ± 6.9	<0.001
Range of motion (% of normal)	84.7 ± 7.1	91.2 ± 6.4	0.004
Time to functional recovery (weeks)	8.1 ± 1.5	6.8 ± 1.3	<0.001

2.3. Complications and Safety Outcomes

Postoperative safety and complication rates were evaluated in both study groups throughout the follow-up period. Overall, both rehabilitation strategies were well tolerated, and no severe adverse events related to the interventions were recorded.

In the conventional physiotherapy group, minor postoperative complications were observed in a limited number of patients. These included transient increases in pain intensity during early rehabilitation sessions and mild joint stiffness, which resolved with continued physiotherapy and did not require additional medical intervention. No cases of infection, delayed wound healing, or treatment discontinuation were reported.

In the platelet-rich plasma group, PRP administration was generally well tolerated. A small number of patients experienced mild and transient local discomfort at the injection site within the first 24–48 hours following administration, which resolved spontaneously. No local infections, inflammatory reactions, or systemic adverse effects associated with PRP were observed. Importantly, no patients required discontinuation of treatment due to PRP-related complications.

The overall incidence of minor complications did not differ significantly between the two groups ($p > 0.05$). These findings indicate that both conventional physiotherapy and PRP-based postoperative treatment strategies demonstrate a favorable

safety profile when applied under standardized clinical conditions. Postoperative complications and safety outcomes in both study groups are summarized in Table 3.

Table 3. Complications and Safety Outcomes

Safety Outcome	Conventional Physiotherapy (n = 40)	PRP Group (n = 40)	p-value
Transient increase in pain	6 (15.0%)	4 (10.0%)	0.50
Joint stiffness	5 (12.5%)	3 (7.5%)	0.46
Injection site discomfort	—	5 (12.5%)	—
Local infection	0	0	—
Delayed wound healing	0	0	—
Systemic adverse events	0	0	—
Treatment discontinuation	0	0	—

3. Discussion

The present study evaluated the comparative effects of conventional physiotherapy and platelet-rich plasma on postoperative tissue healing and functional rehabilitation. Both treatment strategies were safe and clinically effective; however, patients receiving PRP demonstrated faster pain reduction, greater functional improvement, and a shorter time to return to daily activities compared with those undergoing conventional physiotherapy alone. These results suggest that biological enhancement of tissue repair may improve early recovery dynamics in postoperative musculoskeletal rehabilitation.

This interpretation is supported by previous reports indicating that platelet-derived growth factors can modulate inflammation, promote angiogenesis, and facilitate tissue regeneration following surgical interventions [15,16].

The lack of randomization represents a major methodological limitation of the present study and constitutes a significant potential source of selection bias. Because group allocation was based on real-world clinical decision-making rather than a randomized process, unmeasured confounding factors may have influenced the observed differences between groups.

Another important methodological consideration relates to the inherent imbalance between the two interventions. Conventional physiotherapy is a comprehensive, multi-session rehabilitation process involving structured functional training over several weeks, whereas PRP is a single biologic intervention aimed at enhancing tissue healing at the molecular level. The present study was designed to evaluate their independent clinical effects; however, differences in intervention intensity and therapeutic mechanisms may compromise comparability. This asymmetry should be carefully considered when interpreting the magnitude of the observed benefits in the PRP group.

Pain control plays a central role in postoperative recovery, as ongoing pain may limit patient engagement in rehabilitation and delay functional progress. In the present study, pain levels gradually decreased in both groups; however, patients receiving PRP reported significantly lower pain scores at both intermediate and final follow-up assessments. This pattern aligns with previous reports indicating that PRP can modulate postoperative inflammation through the release of platelet-derived growth factors and cytokines, thereby attenuating nociceptive signaling and supporting tissue repair processes [17–19].

Functional recovery outcomes further supported the potential advantages of PRP treatment. Patients in the PRP group achieved higher LEFS scores and greater improvements in range of motion compared with those undergoing conventional physiotherapy. Physiotherapy remains a cornerstone of postoperative rehabilitation, promoting recovery through mechanical loading, neuromuscular adaptation, and functional re-education—mechanisms that are well documented in the literature

[20,21]. PRP, on the other hand, acts primarily at the biological level, enhancing angiogenesis, collagen deposition, and cellular proliferation within healing tissues [21–23]. The interplay between optimized biological repair and structured functional training may help explain the superior outcomes observed in the PRP group.

One of the most clinically relevant findings of this study was the shorter time to functional recovery observed in patients treated with PRP. Early restoration of functional independence is particularly important, as it may reduce the risk of secondary complications, facilitate reintegration into daily activities, and improve overall patient satisfaction. Similar benefits have been reported in previous clinical investigations evaluating PRP as an adjunct in postoperative and musculoskeletal rehabilitation [24,25]. While PRP and physiotherapy may act synergistically within comprehensive rehabilitation models, the present study was intentionally designed to evaluate their independent clinical impact when applied as primary postoperative strategies. Importantly, physiotherapy remains a cornerstone of long-term functional recovery, and PRP should be interpreted within this broader rehabilitative context. From a safety perspective, both treatment strategies were well tolerated. No major adverse events were recorded, and only minor, transient complications were observed in a small number of patients, with no significant differences between groups. These findings are consistent with existing literature supporting the safety of PRP as an autologous therapy when prepared and administered according to standardized clinical protocols [24].

Several limitations should be considered when interpreting these results. The relatively modest sample size may restrict the generalizability of the findings, and the non-randomized study design may introduce selection bias. In addition, variations in surgical procedures and rehabilitation timelines could have influenced individual recovery trajectories. Future randomized controlled trials involving larger cohorts and standardized PRP preparation and administration protocols are needed to further clarify the role of PRP in postoperative rehabilitation [21].

In summary, this study suggests that platelet-rich plasma may offer additional benefits in postoperative tissue healing and functional rehabilitation when compared with conventional physiotherapy alone. A combined approach that integrates biological enhancement through PRP with structured physiotherapy may represent an effective strategy for optimizing postoperative recovery. Further high-quality clinical research is required to establish clear, evidence-based guidelines for the use of PRP in postoperative rehabilitation settings.

Although the present findings suggest that PRP may accelerate certain aspects of postoperative recovery, these results should not be interpreted as evidence for replacing structured physiotherapy. Rather, the study design aimed to isolate the biological contribution of PRP in order to better understand its independent clinical impact. Structured physiotherapy remains fundamental for restoring mobility, neuromuscular coordination, and long-term functional stability. Within this context, PRP may be considered a complementary strategy that enhances tissue healing and supports functional recovery as part of a comprehensive rehabilitation approach. Future research should explore integrated protocols combining biological enhancement with structured physiotherapy to determine whether synergistic effects can further optimize postoperative outcomes.

4. Materials and Methods

4.1. Study Design

This study was designed as a prospective, non-randomized, comparative clinical study. Patients were allocated consecutively according to the postoperative treatment strategy applied in routine clinical practice. The decision regarding group allocation was made by the attending surgical team based on standard postoperative management considerations and was discussed with the patient prior to initiation of rehabilitation. Allocation was not guided by a predefined severity algorithm and was

not formally based on baseline demographic or functional parameters. Insurance status did not determine group assignment. In certain cases, patient preference and logistical factors, such as the immediate availability of PRP preparation, contributed to the final treatment decision. Because allocation reflected real-world clinical decision-making and no randomization procedure was performed, potential selection bias cannot be excluded. A total of 80 patients were enrolled and allocated to two parallel groups based on the postoperative rehabilitation strategy received: conventional physiotherapy or platelet-rich plasma (PRP)–based treatment. Ethical approval for study was granted by the Research Ethics Committee of C.F. Hospital, Oradea, Romania, ref. no: 2438/ 23.11.2024. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Given the non-randomized allocation process, the possibility of selection bias and residual confounding cannot be excluded and should be considered when interpreting the findings.

4.2. Study Population

Eighty adult patients (≥18 years) scheduled for elective surgical procedures involving the lower extremity (knee and/or related periarticular soft tissues) were consecutively recruited from a specialized clinical and rehabilitation center. All patients were considered suitable for postoperative rehabilitation and agreed to participate in the study.

Patients were allocated to two groups: Group A (Conventional Physiotherapy Group): 40 patients who underwent standard postoperative rehabilitation according to physiotherapy protocols; Group B (PRP Group): 40 patients who received autologous platelet-rich plasma as part of their postoperative treatment strategy.

Exclusion criteria included active infection at the surgical site, systemic inflammatory or autoimmune diseases, coagulation disorders, platelet dysfunction, anticoagulant therapy, malignancy, pregnancy, and refusal to provide informed consent.

All participants provided written informed consent prior to inclusion in the study.

4.3. Intervention Protocols

4.3.1. Conventional Physiotherapy Group

Patients allocated to Group A followed a standardized postoperative physiotherapy program initiated according to surgical recommendations. The rehabilitation protocol included therapeutic exercises to restore joint mobility and muscle strength, manual therapy techniques, proprioceptive training, and functional re-education. Sessions were conducted under the supervision of licensed physiotherapists, with frequency and intensity progressively adjusted based on individual recovery stages. Patients in this group did not receive platelet-rich plasma during the postoperative period.

4.3.2. Platelet-Rich Plasma Group

Patients allocated to Group B received autologous platelet-rich plasma (PRP) as an adjunctive postoperative intervention. PRP was prepared from peripheral venous blood using a standardized centrifugation protocol routinely applied in clinical practice, resulting in a platelet-enriched plasma fraction with an approximate three- to five-fold increase in platelet concentration compared with baseline whole blood. A single PRP injection with a volume of 3–5 mL was administered locally at the surgical or peri-surgical site under sterile conditions, with timing standardized within the early postoperative period. PRP was administered without exogenous activation. Injections were performed without ultrasound guidance, based on anatomical landmarks, in accordance with standard postoperative clinical practice. All patients in the PRP group received the same PRP preparation and administration protocol. Patients in this group did not undergo a structured physiotherapy program. Patients in this group did not undergo a structured physiotherapy program. Instead, they received standardized basic postoperative mobilization guidance in accordance with surgical recommendations. This approach was intentionally adopted to isolate the biological

effect of PRP on postoperative tissue healing and functional recovery, avoiding potential confounding from concurrent structured rehabilitation.

4.4. Outcome Measures

Postoperative outcomes were evaluated using both clinical and functional parameters outcome assessors were not formally blinded to group allocation. Primary outcomes included indicators of tissue healing, such as pain reduction, resolution of local inflammation, and time to functional recovery. Functional recovery was assessed using the Lower Extremity Functional Scale (LEFS), a validated questionnaire widely used in postoperative rehabilitation of lower limb conditions. The LEFS consists of 20 items, each scored on a 0–4 scale, with higher scores indicating better functional status. Secondary outcomes focused on rehabilitation progress, including range of motion of the operated lower extremity joint, assessed using a standardized universal goniometer and expressed in degrees. Muscle strength was evaluated using manual muscle testing, and functional performance was assessed using the Lower Extremity Functional Scale (LEFS). Outcome assessments were performed at 2 weeks (early follow-up), 6 weeks (intermediate follow-up), and 12 weeks postoperatively (final evaluation).

4.5. Statistical Analysis

Continuous variables were expressed as mean ± standard deviation. Statistical analysis was performed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Normality of data distribution was assessed using the Shapiro–Wilk test. Continuous variables were expressed as mean ± standard deviation. Between-group comparisons for normally distributed variables were conducted using the independent samples t-test, while non-normally distributed variables were analyzed using the Mann–Whitney U test. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. A p-value < 0.05 was considered statistically significant.

5. Conclusions

Both conventional physiotherapy and platelet-rich plasma were safe and clinically effective in promoting postoperative tissue healing and functional rehabilitation. PRP was associated with faster pain reduction and improved functional recovery; however, these findings should be interpreted cautiously given the non-randomized design and moderate sample size. The results suggest a potential role for PRP as an adjunct to, rather than a replacement for, structured physiotherapy. Further randomized controlled studies are required to confirm these observations and establish standardized clinical protocols.

Author Contributions: Conceptualization, M.I.S. and M.S.H.; methodology, C.D.C.; software, R.F.B.; validation, I.A.B. and C.A.H.; formal analysis, E.C.; investigation, M.I.S.; resources, T.G.A.; data curation, I.L.B.; writing—original draft preparation, M.I.S.; writing—review and editing, E.C.; visualization, C.D.C.; supervision, M.S.H.; project administration, R.F.B.; funding acquisition, I.A.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Committee of C.F. Hospital, Oradea, Romania, ref. no: 2438/ 23.11.2024 for studies involving humans.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Acknowledgments: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Gurtner, G.C.; Werner, S.; Barrandon, Y.; Longaker, M.T. Wound repair and regeneration. Nature 2008, 453, 314–321. https://doi.org/10.1038/nature07039
2. Guo, S.; DiPietro, L.A. Factors affecting wound healing. J. Dent. Res. 2010, 89, 219–229. https://doi.org/10.1177/0022034509359125
3. Kehlet, H.; Wilmore, D.W. Multimodal strategies to improve surgical outcome. Am. J. Surg. 2002, 183, 630–641. https://doi.org/10.1016/S0002-9610(02)00866-8
4. Fransen, M.; McConnell, S. Exercise for osteoarthritis of the knee. Cochrane Database Syst. Rev. 2008, CD004376. https://doi.org/10.1002/14651858.CD004376.pub2
5. Kisner, C.; Colby, L. Therapeutic Exercise: Foundations and Techniques; F.A. Davis: Philadelphia, PA, USA, 2017.
6. Costescu, E.; Călin, G.; Tîrlea, V.; Țabrean, M.C. Non-invasive physiotherapeutic approaches in biliary dyskinesia. Balneo PRM Res. J. 2024, 15, 749. https://doi.org/10.12680/balneo.2024.749
7. Costescu, E.; Ciuhodaru, T.; Călin, G.; Mihai, C.; Grierosu, C.; Damir, D.L. Non-invasive neuromodulatory therapies applied in trigeminal neuralgia. Balneo PRM Res. J. 2024, 15, 705. https://doi.org/10.12680/balneo.2024.705
8. Marx, R.E. Platelet-rich plasma: Evidence to support its use. J. Oral Maxillofac. Surg. 2004, 62, 489–496. https://doi.org/10.1016/j.joms.2003.12.003
9. Andia, I.; Maffulli, N. Platelet-rich plasma for managing pain and inflammation in osteoarthritis. Nat. Rev. Rheumatol. 2013, 9, 721–730. https://doi.org/10.1038/nrrheum.2013.141
10. Everts, P.A.; et al. Platelet-rich plasma and platelet gel: A review. J. Extra Corpor. Technol. 2006, 38, 174–187.
11. Anitua, E.; et al. The biological basis of PRP. Trends Biotechnol. 2004, 22, 227–233. https://doi.org/10.1016/j.tibtech.2004.02.007
12. Boswell, S.G.; et al. Platelet-rich plasma: A milieu of bioactive factors. Arthroscopy 2012, 28, 429–439. https://doi.org/10.1016/j.arthro.2011.10.018
13. Moraes, V.Y.; et al. Platelet-rich therapies for musculoskeletal soft tissue injuries. Cochrane Database Syst. Rev. 2014, CD010071. https://doi.org/10.1002/14651858.CD010071.pub3
14. Filardo, G.; et al. PRP injections for the treatment of knee osteoarthritis. Am. J. Sports Med. 2015, 43, 1575–1582. https://doi.org/10.1177/0363546515574062
15. Munteanu, C.; Popescu, C.; Ciobanu, V.; Onose, G. Biosignals and motion-derived outcomes in balneotherapy and PRM. Balneo PRM Res. J. 2025, 16, 885. https://doi.org/10.12680/balneo.2025.885
16. Chahla, J.; et al. PRP in orthopedic surgery. Arthroscopy 2017, 33, 1510–1521. https://doi.org/10.1016/j.arthro.2017.03.005
17. Fitzpatrick, J.; et al. Analysis of PRP preparations. Am. J. Sports Med. 2017, 45, 226–233. https://doi.org/10.1177/0363546516669741
18. Foster, T.E.; et al. PRP: From basic science to clinical applications. Am. J. Sports Med. 2009, 37, 2259–2272. https://doi.org/10.1177/0363546509349921
19. Andia, I.; Abate, M. Platelet-rich plasma: Underlying biology and clinical correlates. Knee Surg. Sports Traumatol. Arthrosc. 2013, 21, 987–996. https://doi.org/10.1007/s00167-012-2211-4
20. Costescu, E.; Păduraru, O.; Călin, G.; Țabrean, M.C.; Păduraru, C.Ș. Non-invasive rehabilitation in Morbus Ledderhose disease. Balneo PRM Res. J. 2024, 15, 742. https://doi.org/10.12680/balneo.2024.742
21. Bleakley, C.; et al. Rehabilitation strategies after soft tissue injury. Br. J. Sports Med. 2015, 49, 155–160. https://doi.org/10.1136/bjsports-2014-094224
22. Zhang, J.; et al. Growth factors and tendon healing. J. Orthop. Res. 2013, 31, 999–1006. https://doi.org/10.1002/jor.22311
23. Murray, M.M.; et al. Use of biologics in orthopedic surgery. J. Bone Joint Surg. Am. 2016, 98, 1–9. https://doi.org/10.2106/JBJS.O.00573
24. Filardo, G.; et al. Safety of PRP applications. Knee Surg. Sports Traumatol. Arthrosc. 2016, 24, 150–157. https://doi.org/10.1007/s00167-015-3762-0
25. Laudy, A.B.; et al. Efficacy of PRP injections. Br. J. Sports Med. 2015, 49, 657–672. https://doi.org/10.1136/bjsports-2014-094036.