



Introduction

- Osteoarthritis (OA) is the most common form of arthritis, affecting over 32 million Americans. It is among the fastest growing health conditions in the United States and the second leading cause of disability, with 1 in 7 adults diagnosed. Driven by an aging population, OA prevalence is expected to continue rising.
- Low dose radiation therapy (LDRT) has been used for decades, particularly in Europe, with strong evidence supporting its effectiveness for OA-related pain. However, literature from the United States remains limited. Over the past year, our division at Scripps Clinic has increasingly utilized LDRT for OA.

Objective

To evaluate the effectiveness of low dose radiation therapy (LDRT) in reducing pain and improving quality of life and function in patients with symptomatic osteoarthritis.

Methods

- We conducted a retrospective review of patients ≥40 years old treated with low dose radiation therapy (LDRT) for osteoarthritis at Scripps Clinic from June 2024 to May 2025. Exclusions included in rheumatoid arthritis, spinal OA, pregnancy, or incomplete data.
- Patients received 0.5 Gy per fraction (total 3 Gy); some underwent a second course. Data included demographics, joint treated, and prior therapies.
- Outcomes assessed were pain (VAS), analgesic use (days/week), and QOL and ADL (1–10 scale). Assessments were recorded pre-treatment ,end of treatment, and at multiple follow-up points.

Results

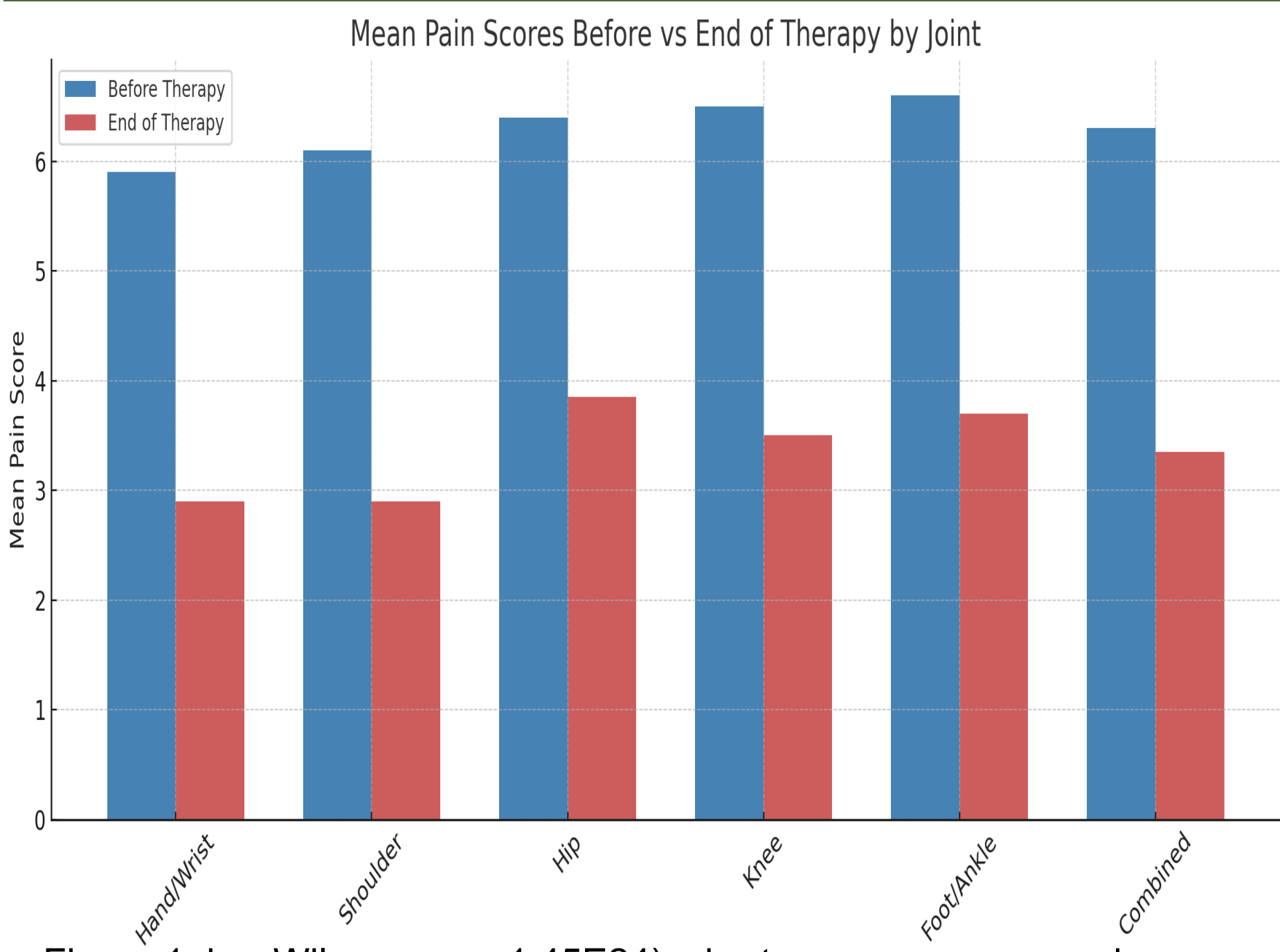


Figure 1: bar Wilcoxon $p = 1.45E24$). chart compares mean pain scores before therapy (blue) and at the end of therapy (red) across six joint categories. Among 184 joints, the mean score significantly decreased from 6.31 ± 2.07 before treatment to 3.38 ± 2.51 at follow-up, with a mean difference of -2.93 ± 2.56 (paired t-test $p = 5.70E35$;

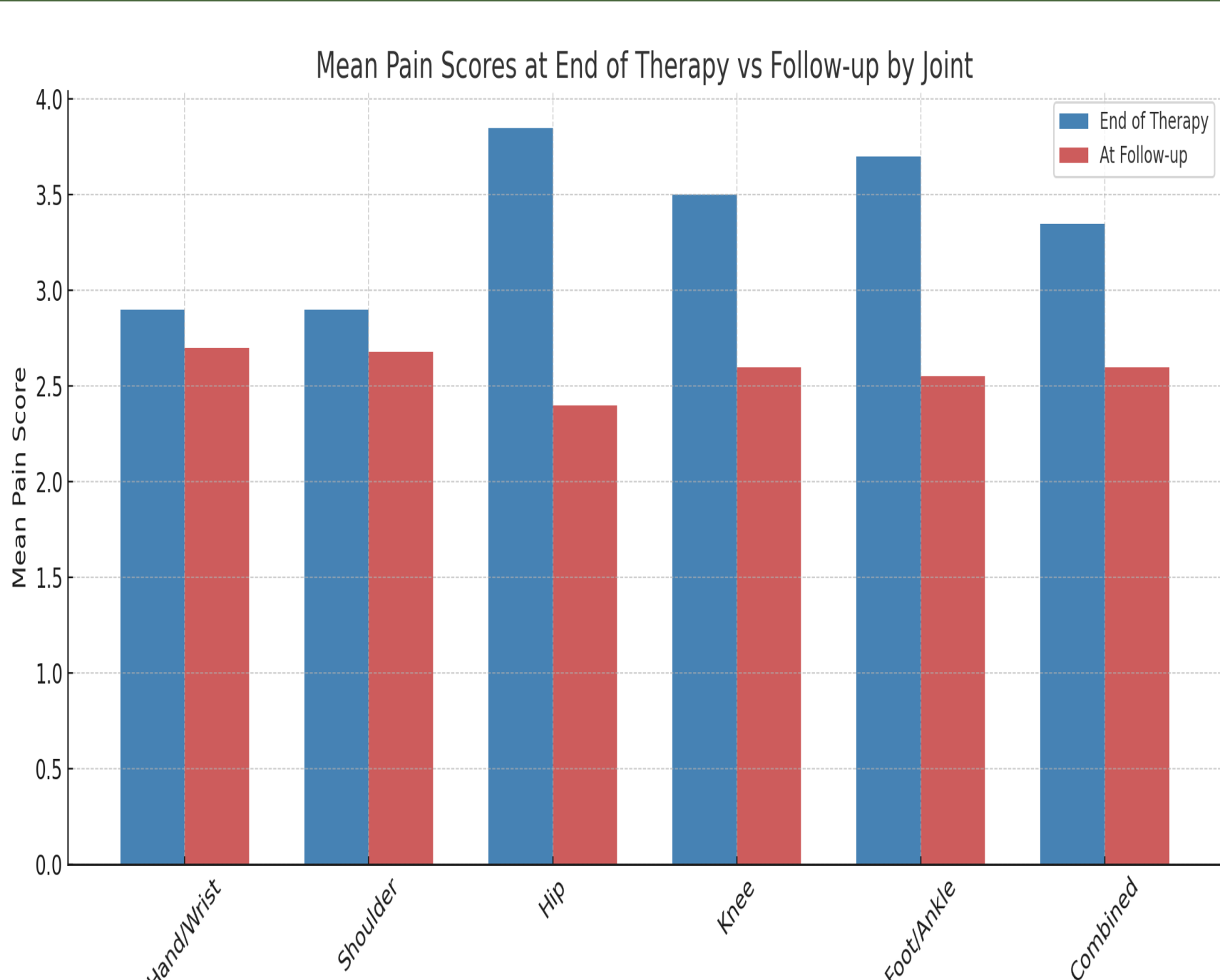


Figure 2: Among 184 joints, the mean score decreased from 3.38 ± 2.51 at the end of treatment to 2.51 ± 2.80 at follow-up, with a mean difference of -0.88 ± 2.96 (paired t-test $p = 9.38E5$; Wilcoxon $p = 5.04E5$)

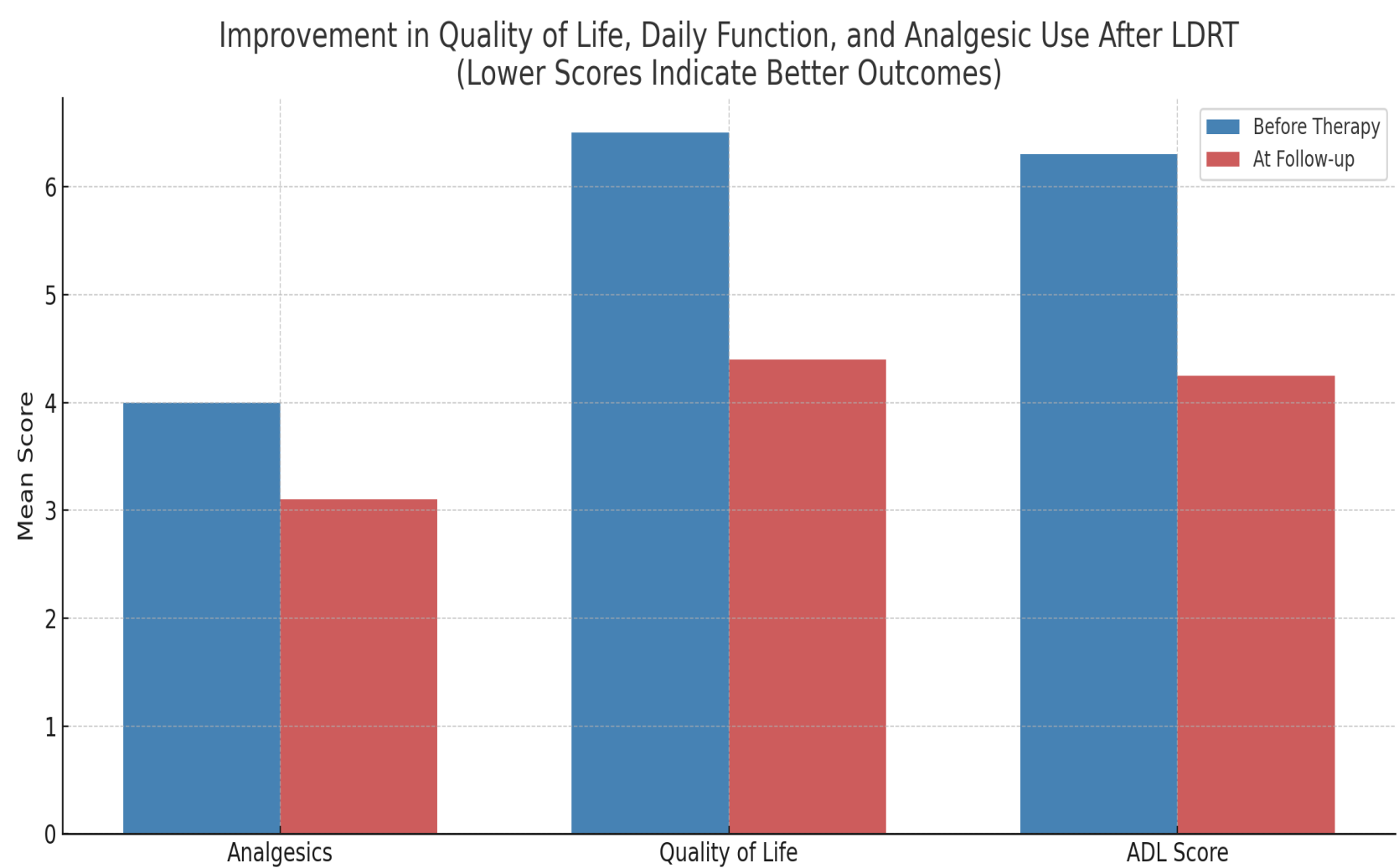


Figure 3: Among patients receiving treatment, analgesic use (-0.92 ± 2.00 ; $p = 1.20E4$), quality of life (-2.13 ± 2.20 ; $p = 7.07E13$), and activities of daily living (-2.05 ± 2.30 ; $p = 4.21E11$) all showed significant improvements based on mean score reductions.

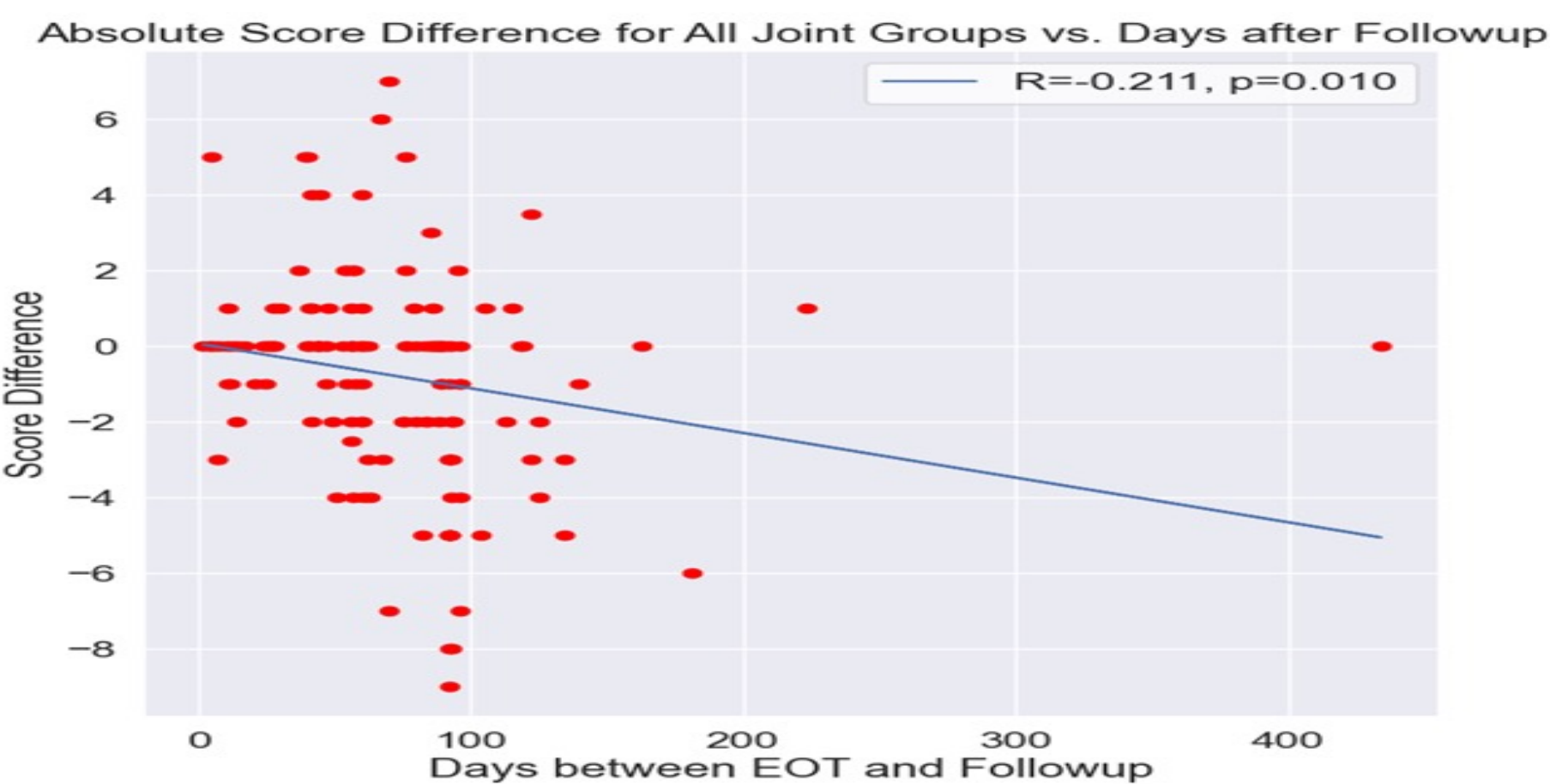


Figure 4: Scatter plot showing the relationship between the number of days between the end of treatment (EOT) and follow-up versus the absolute score difference across all joint groups.

Variable	Increased Score	Decreased Score	No Change in Score
Hand/Wrist	5 / 46 (10.9%)	39 / 46 (84.8%)	2 / 46 (4.3%)
Shoulder	1 / 24 (4.2%)	20 / 24 (83.3%)	3 / 24 (12.5%)
Hip	0 / 33 (0.0%)	31 / 33 (93.9%)	2 / 33 (6.1%)
Knee	2 / 70 (2.9%)	63 / 70 (90.0%)	5 / 70 (7.1%)
Foot/Ankle	1 / 11 (9.1%)	9 / 11 (81.8%)	1 / 11 (9.1%)
Combined	9 / 184 (4.9%)	162 / 184 (88.0%)	13 / 184 (7.1%)

Table 1: with multiple joint therapies are counted for each joint Represents Joint Difference Counts: Before Therapy vs. Follow-up. Patients

Limitations/ Next step

- Some patients report pain from a new site during follow-up, which may artificially inflate pain scores, misrepresenting treatment response at the original site.
- Some patients did not return for follow-up after completing treatment, leading to missing outcome data and potential selection bias in follow-up analysis.
- Conduct a prospective longitudinal study to evaluate durability of symptom relief over 6–12 months post-treatment

Conclusion

LDRT significantly reduced joint pain, improved quality of life, and decreased analgesic use across all joint types. At follow-up, benefits were sustained for patients while few experienced no change or further improved. Most joints showed pain reduction, with minimal worsening . These findings support LDRT as a safe, effective, and durable non-invasive option for managing joint pain.

References

Koneru, B. N., Sick, J., Shaikh, H. A., Spengler, H., Small, W., & Shaffer, R. (2025). *Low-dose radiotherapy for osteoarthritis: A retrospective single-institution analysis of 69 patients and 168 joints. International Journal of Radiation Oncology, Biology, Physics*. Advance online publication. <https://doi.org/10.1016/j.ijrobp.2025.04.040>

Acknowledgement

I would like to thank Dr. Nobert Kased for his outstanding mentorship and guidance throughout this project. I’m also grateful to Theresa Hill, Dr. Laura Nicholson, Dr. Stuti Jaiswal, and the SURI Student Research Internship at Scripps Research for making this opportunity possible