

Analyzing the Effects of Hip and Knee Exercise on Patellofemoral Joint Pain

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Abstract

The effects of knee and hip exercises on the pain severity and occurrence in patellofemoral joint pain (PFP) patients over various time intervals were analyzed to determine whether or not there is a correlation between various exercise treatments and quicker reductions in PFP symptoms. Results show quicker pain reductions among the combined exercise group compared to the knee-only group, indicating that performing the combination of hip and knee exercises may be more beneficial to injury recovery than performing knee exercise only in PFP recovery.

Introduction

Patellofemoral joint pain (PFP) is described as any type of peripatellar (behind the kneecap) or retropatellar (around the kneecap) pain unrelated to trauma. It is caused by malalignment of the knee and comprises about 25-40% of all knee problems seen in sports injury clinics, making it one of the primary knee injuries in humans. As a result of PFP's complex nature, it is extremely challenging to treat and can affect the patient for up to twenty years.

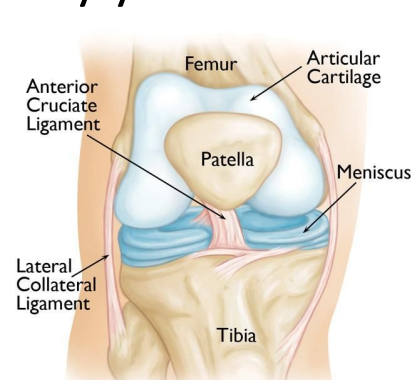


Fig. 1. Diagram of the knee joint Fig. 2. PFP-affected knee vs. normal knee x-rays.

Purpose

The purpose of this study is to identify what exercise therapy treatments result in the quickest and longest-lasting reduction of PFP pain. The effectiveness of hip and knee versus knee-only exercise will be compared to determine whether one group consistently experiences reductions in pain sooner than another.

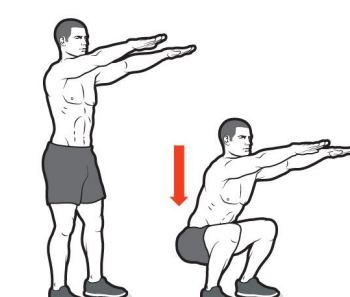
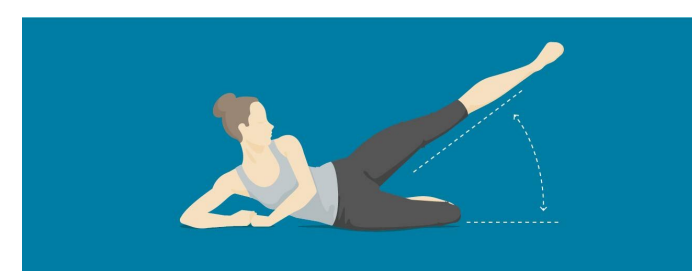


Fig. 3. Example of hip exercise (hip abduction). Fig. 4. Example of knee exercise (squats).

Research Question

Does the combination of hip and knee exercise result in accelerated recovery for PFP patients compared to knee-only exercise?

Hypothesis

A combination of hip and knee exercises concurrently will reduce pain and speed up the recovery process in PFP patients more than will knee exercises, alone.

References

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 (see academic paper)

Methods

Google Scholar, Elsevier, ResearchGate, etc. was searched for studies analyzing the effects of hip and knee exercise therapy treatments on PFP patient pain levels. Keywords, such as "patellofemoral joint pain syndrome" were used to gather relevant articles. Additional literature was collected by hand searching reference papers.

Results

Table 1. Patient pain measured during intervention by the Visual Analogue Scale (VAS)

Time (weeks) When Pain is Measured	Hip and Knee Group	Knee-Only Group
0	5.66	5.37
4	2.89	4.46
6	1.96	2.56
8	2.38	2.77
8.69	1.40	3.10

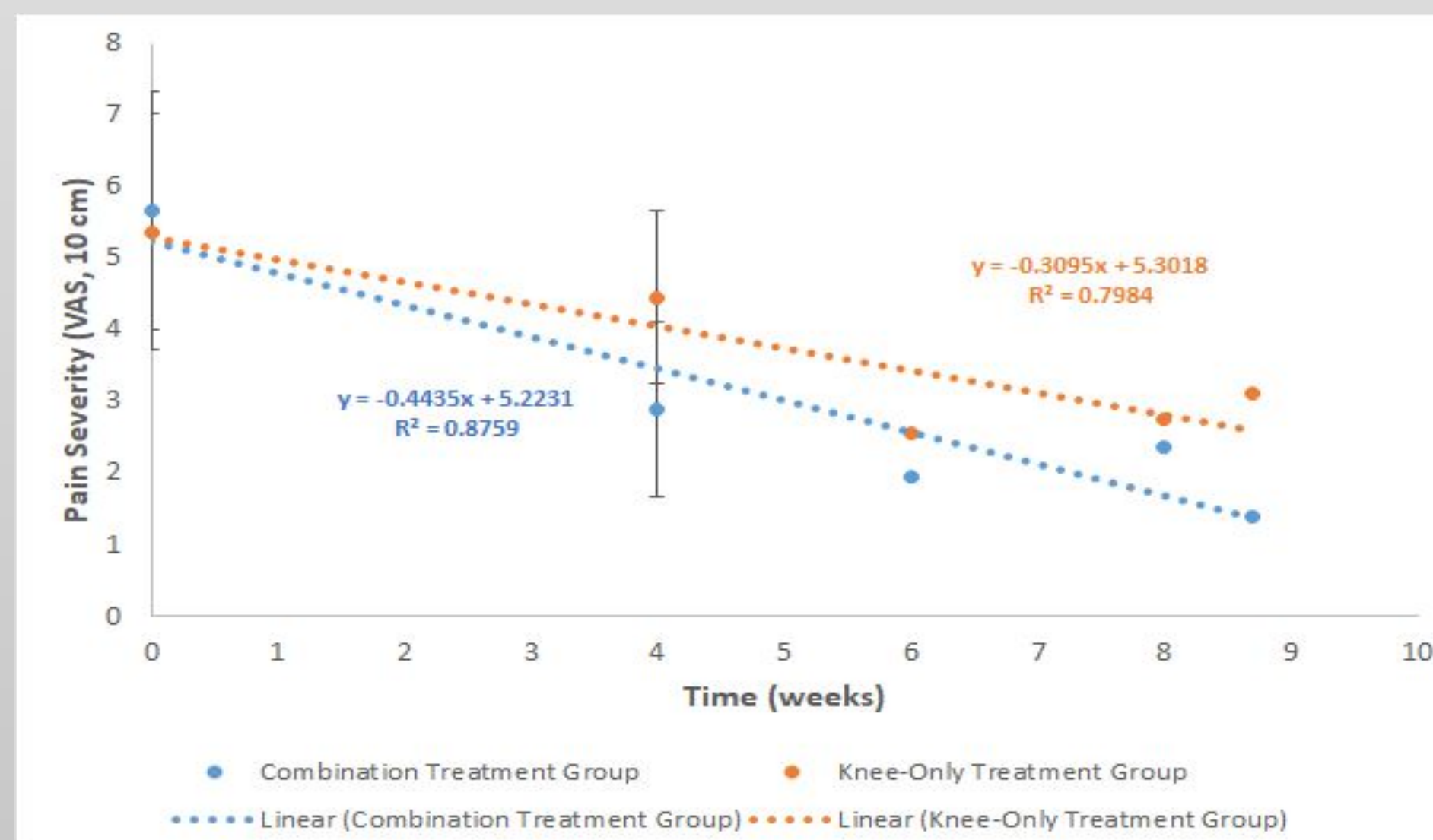


Fig. 5. Average VAS results among patients at 0, 4, 6 and 8 weeks, and 2 months.

Table 2. Patient pain measured by the VAS post-intervention— three months post-eight-week intervention, three months post-two-month intervention, and six months post-eight-week intervention.

Number of weeks after beginning of treatment	Average VAS Scores	
	Hip and Knee Group	Knee-Only Group
21.04	2.10	2.40
21.73	0.90	2.50
34.07	2.00	2.40

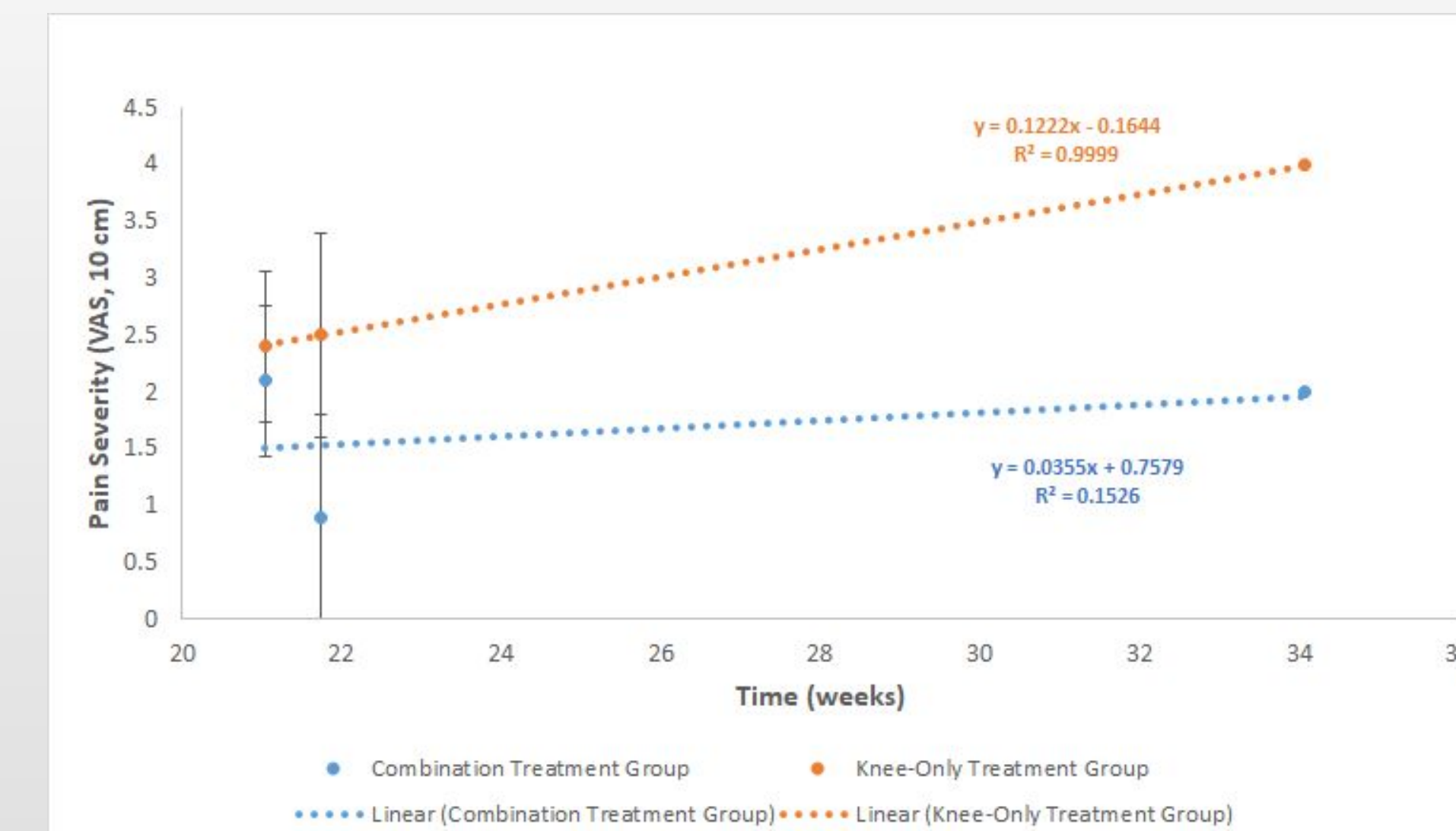


Fig. 6. Average VAS results among patients at their follow-up appointment, as called for in three studies.

Discussion

When comparing the combination and knee-only group pain, patients experience less pain when undergoing hip and knee exercise therapy, as shown in Table 1. As shown in Figure 5, patients in both groups experienced pain reductions after 0, 4, 6 and 8 weeks, and 2 months (8.69 weeks). The combination group reported greater and quicker reductions in pain compared to the knee group, however, indicating that the combination of hip and knee exercises simultaneously more effectively decreases pain than knee exercises alone. As shown in Table 2, patients who performed hip exercises in conjunction with knee exercises reported lower follow-up pain scores, suggesting hip and knee exercise allows for longer-lasting PFP pain reduction. A likely cause for these trends is more muscle groups working to support the lower extremity and help treat malalignment in the body, making the patella less likely to shift.

Conclusion

Performing hip and knee exercise when treating PFP is more favorable than performing knee exercise alone because patients feel less intense pain, and their pain is alleviated sooner.

Further Work

To further contribute to this study, research analyzing the specific durations of knee and hip vs. knee-only exercise therapy could be conducted among the same population to determine if one exercise is more efficient than another. In addition, PFP pain occurrence is measured in various time intervals in the current literature. More reliable information could be gathered by conducting studies that analyze PFP pain over the same time intervals to see if findings are consistent. Various combinations of PFP treatment could also be studied, such as the effects of orthotics and a specific exercise on PFP, the effects of exercising less-researched muscle groups, etc.

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