

Hip Flexibility and Strength Immediately Following Manual Therapy Interventions

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Abstract. Our study examined hip internal, external, abduction, and extension strength, as well as hip internal and external ROM both before and immediately after manual intervention. Our goal was to determine if manipulation and /or mobilization would increase strength and ROM greater than that of the control group. Sixty-one college aged students participated and were randomly assigned to one of three groups (control, mobilization, and manipulation groups). There was no significant difference within the control, mobilization, and manipulation groups when testing external rotation strength or in pre and post test measurements between the three testing groups in any of the dependent variables.

1. Introduction

Many pathologies of the hip involve weakness of various hip musculature and subsequent dysfunction. Decreased hip strength is linked to lower extremity muscle strains and pathology including patellofemoral pain syndrome (PFPS)¹. The muscles that are most affected by hip pathology are the gluteal muscles; however, our study aims to examine hip rotators and abductors as well. Muscle weakness may be caused by inhibition of a muscle related to hypomobility of the underlying joint². There are five grades of mobilization; Grades I-IV is considered low velocity and V is high velocity manipulation. Grades I and II are used for pain relief, while grades III and IV are used to increase ROM³. Joint manipulation is a passive movement of a skeletal joint that aids in releasing, relieving pain, and restoration of motion and function⁴. This study looks to see if the hip joint gains strength and/or ROM immediately after a manipulation or mobilization. It was hypothesized that those subjects in the manipulation and mobilization groups would have a greater increase in hip flexibility and strength than those subjects in the control group receiving no intervention.

2. Experiment, Results, Discussion, and Significance

Sixty-one male (n=19) and female (n=42) college-aged (mean age=25.1 years) individuals in the College of Health Professions at Wichita State University participated in the study. Subjects were randomly assigned into one of three groups: a control group (n=20), a supine SI joint regional manipulation group (n=23), and a group receiving a grade III/IV P-A side lying hip mobilization (n=18), all performed by a physical therapist.

Subjects were tested before and after interventions for strength using a hand held dynamometer, the Nicholas Manual Muscle Tester (NMMT). All angles of ROM were recorded using a bubble goniometer. Leg dominance was determined by which leg the subject kicks a ball with. Immediately following the intervention, the subjects were tested again for strength and ROM. A double-blind method in which the testers and subjects were blinded was utilized.

Results

There was no significant difference within the control, mobilization, and manipulation groups when testing external rotation strength. Furthermore, there was no significant difference found in the pre and post tests between the three testing groups in any of the dependent variables.

However, within the control, mobilization, and manipulation groups, a significant interaction was found between pre and post test groups when testing for internal rotation strength, abduction strength, extension strength, internal rotation range of motion, and external rotation range of motion. The data, in Tables 1-3, outlines pre and post test means and significant differences for our selected variables in the control, mobilization, and manipulation groups.

Discussion

The purpose of this study was to determine whether subjects in the manipulation and grade III/IV

mobilization groups would have a greater increase in hip flexibility and strength than those subjects in the control group receiving no intervention. Data analysis of this study revealed a significant interaction between pre and post tests within the control and intervention groups for each dependent variable.

Analysis of this data showed that there was a significant difference between pre and post testing in both the manipulation and mobilization groups in all but one or two dependent variables, respectively, which was expected due to the clinically proven effects of mobilizations and manipulations. However, it was expected that the intervention groups would show a consistent significant increase across all dependent variables.

Unexpectedly, analysis also revealed a significant difference between pre and post testing in the control group in three of the six dependent variables measured. This could possibly be attributed to several extraneous variables.

These findings differ from other studies we looked at in that they found a significant difference from pre- to post-testing between a control group and a mobilization group.

Recommendations for further research include implementing a familiarization session prior to testing, in addition to a pilot study to determine how many of those sessions would be needed before performance is considered stable⁵. In addition, a sample size of at least thirty subjects in each group would better follow clinically proven research guidelines.

3. Conclusions

Subjects in the manipulation and grade III/IV mobilization groups did not have a greater increase in hip flexibility and strength than those subjects in the control group receiving no intervention. Additional research is needed to determine the clinical effects of hip mobilization/manipulation on hip flexibility and strength.

Tables

Table 1
Pre and Post Test Results in Control Group

Group	Variable	Pre	Post	Significance
Control				
IR	(kg)	14.19±4.3	14.23±4.3	1.00
ER	(kg)	13.70±3.8	13.61±3.7	.135
Abd	(kg)	25.33±3.5	25.40±3.5	.015

Ext	(kg)	22.44±4.6	22.34±4.5	.011
IR	(deg)	46.50±10.1	47.85±11.3	.041
ER	(deg)	51.67±11.0	53.08±12.3	.067

Table 2
Pre and Post Test Results in Mobilization Group

Group	Variable	Pre	Post	Significance
Mob				
IR	(kg)	14.01±3.4	14.86±3.4	.010
ER	(kg)	13.48±2.8	14.08±2.9	.023
Abd	(kg)	26.04±5.4	26.86±5.2	.179
Ext	(kg)	22.98±4.4	23.96±4.8	.003
IR	(deg)	44.36±10.0	46.19±9.4	.001
ER	(deg)	51.44±9.0	51.08±8.6	.611

Table 3
Pre and Post Test Results in Manipulation Group

Group	Variable	Pre	Post	Significance
Manip				
IR	(kg)	12.59±3.1	14.31±5.8	.022
ER	(kg)	13.10±3.8	13.57±4.4	.062
Abd	(kg)	25.20±3.8	26.63±4.2	.000
Ext	(kg)	21.84±4.5	22.88±4.6	.000
IR	(deg)	42.73±9.4	46.51±10.1	.000
ER	(deg)	51.31±10.6	54.37±10.8	.000

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