

EFFECTS OF LOW BACK MANUAL THERAPY ON PERCEIVED STATUS CHANGE AND KNEE EXTENSOR TORQUE

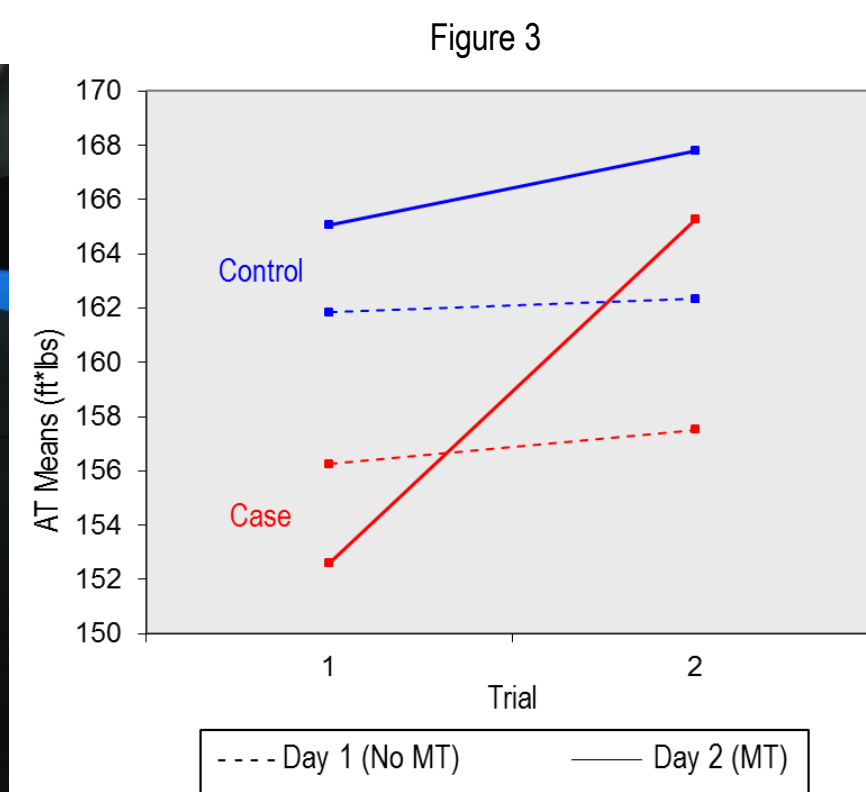
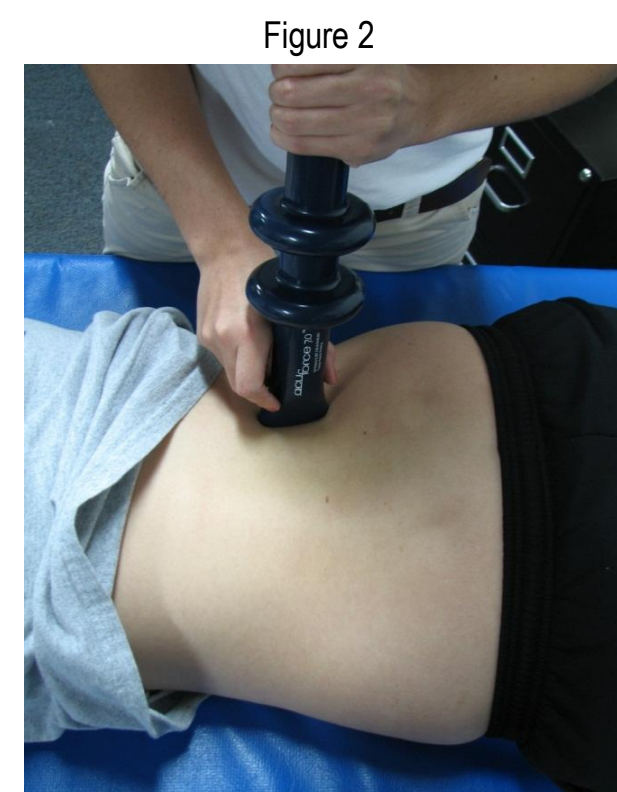
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BACKGROUND AND PURPOSE

- Evidence of manual therapy (MT) use by many ancient cultures dates as far back as 2000 BC¹
- Many sports medicine practitioners utilize a variety of MT techniques to treat musculoskeletal pain and disability
- MT is often used to treat low back pain (LBP); however, there is little research evidence of long-term benefits^{2,3}
- Quadriceps inhibition often co-exists with low back dysfunction,⁴ but many clinicians are unaware of its existence
- Trigger points in the quadratus lumborum (QL) muscle may contribute to LBP and associated quadriceps inhibition⁵
- Any effect of MT applied to the QL on quadriceps activation in subjects with low back dysfunction is unknown
- The purpose of this study was to quantify any benefit that may be derived from MT applied to the QL in terms of perceived change in discomfort or knee extensor torque output among college athletes with low back dysfunction

SUBJECT CHARACTERISTICS

- 24 collegiate athletes: 20.4 ± 1.5 years, 1.74 ± 0.12 m, 79.92 ± 20.56 kg
 - Football (8), softball (8), women's tennis (4), men's basketball (2), women's golf (2)
 - 10 Males: 20.4 ± 1.4 years, 1.86 ± 0.06 m, 97.82 ± 17.05 kg
 - 5 cases: 1.86 ± 0.08 m, 97.34 ± 22.90 kg; 5 matched-controls: 1.86 ± 0.07 m, 98.30 ± 14.22 kg
 - 14 Females: 20.4 ± 0.50 years, 1.65 ± 0.04 m, 67.13 ± 9.70 kg
 - 7 cases: 1.66 ± 0.05 m, 69.91 ± 13.62 kg; 7 matched-controls: 1.65 ± 0.04 m, 64.36 ± 4.21 kg
- Selection criteria for cases: Oswestry Disability Index (ODI) score ≥ 10; no acute musculoskeletal injury symptoms
- Selection criteria for controls: ODI score < 10; no acute musculoskeletal injury symptoms
 - Matched as closely as possible to cases with regard to gender, sport, position, height, and weight

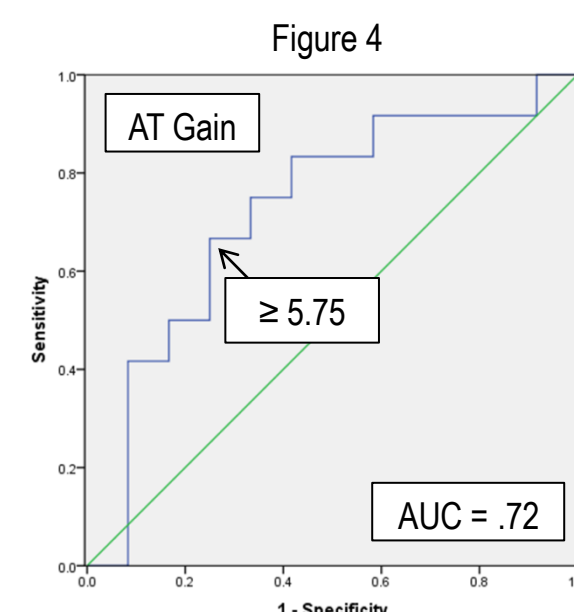


METHODS

- All subjects (cases and controls) reported for two testing days that were separated by 48 hours
- Day 1:
 - Isometric knee extensor torque obtained from dynamometer (Biodex System 3, Biodex Medical, Shirley, NY)
 - Knee flexion angle = 60 degrees; average torque (AT) output for 5-second maximum effort
 - Average of 3 successive repetitions for right extremity; 10-second interval between repetitions
 - Second isometric testing trial performed with identical procedures after 15 minutes of inactivity
- Day 2:
 - Isometric testing performed with identical procedures to those used for day 1
 - Following initial isometric testing trial, MT applied to low back, over QL
 - MT tool (AcuForce® 7.0, Magister Corp., Chattanooga, TN) used to administer soft tissue treatment
 - MT tool weight = 7 lbs (3.2 kg); no additional force was applied
 - Warm-up, cross-fiber, and trigger point techniques administered (Figures 1 & 2)
 - Global Rating of Change (GRC) scale used to assess perception of any change in status (positive or negative)
 - 15-level response option (+7 to -7; 0 designation for no change)
 - Second isometric testing trial performed with identical procedures after administration of MT
- Analysis procedures: Repeated measures ANOVA, receiver operating characteristic (ROC) analysis

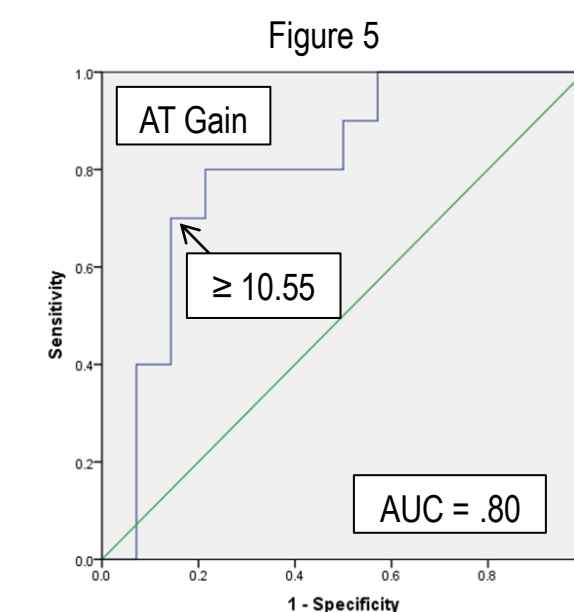
Table 1

| | Trial 1 | Trial 2 | |
|-------|---------|---------------|---------------|
| Day 1 | Case | 156.25 ±30.17 | 157.51 ±33.77 |
| | Control | 161.85 ±48.10 | 162.33 ±49.53 |
| Day 2 | Case | 152.51 ±33.25 | 165.28 ±39.26 |
| | Control | 165.07 ±52.43 | 167.80 ±51.89 |



| AT Gain | ODI ≥ 10 | ODI < 10 |
|---------------|----------|----------|
| ≥ 5.75 ft-lbs | 8 | 3 |
| < 5.75 ft-lbs | 4 | 9 |
| Total | 12 | 12 |

Odds Ratio = 6.00
90% CI: 1.35 - 26.60



| AT Gain | GRC ≥ 4 | GRC < 4 |
|----------------|---------|---------|
| ≥ 10.55 ft-lbs | 7 | 2 |
| < 10.55 ft-lbs | 3 | 12 |
| Total | 10 | 14 |

Odds Ratio = 14.00
90% CI: 2.58 - 76.11

RESULTS

- AT mean and standard deviation for each combination of day and trial for cases and controls presented in Table 1
- Repeated measures ANOVA demonstrated a day X trial interaction ($F_{1,22}=4.64$; $p=.043$)
 - Greater AT gain from trial 1 to trial 2 on day 2 (Figure 3)
 - Greater AT gain observed for cases, but no significant difference between groups ($F_{1,22}=1.137$; $p=.715$)
- ROC analysis of AT gain in relation to case status (ODI ≥ 10) vs. control status (ODI < 10) presented in Figure 4
 - AT gain of approximately 6 ft-lbs or more following MT found to be 6 X more likely for cases than controls
 - Median ODI score was 0 for controls (range 0-4) and 13 for cases (range 10-24)
- ROC analysis of AT gain in relation to GRC change (≥ 4 vs. < 4 units) presented in Figure 5
 - AT gain of approximately 11 ft-lbs or more following MT found to be 14 X more likely for GRC ≥ 4 than < 4 units
 - Median was +4 GRC units for cases (range 2-6 units) and 0 GRC units for controls (range 0-6 units)

CLINICAL RELEVANCE

- AcuForce® 7.0 MT focused on the QL can increase quadriceps maximum voluntary torque output
 - Subjects with ODI ≥ 10 (100% of cases; 0% of controls) demonstrated greatest torque output gain
- 71% of subjects (17/24) reported feeling more flexible and relaxed, which was reflected by GRC improvement
 - Subjects with GRC ≥ 4 gain (58% of cases; 25% of controls) demonstrated greatest torque output gain
- The results of this study provides substantial evidence to support the use of a specific MT technique
 - Stimulation of QL appears to have a disinhibition effect on voluntary quadriceps activation

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