The Effects of Graston Treatment Time on the Quadriceps Muscles’ Strength and Fatigue in Division III Football Players

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ABSTRACT

Purpose: It is unclear whether or not Graston Technique (GT) treatment times of 8 and 15 minutes cause physiological and psychological effects compared to instances where no treatment is administered. It was hypothesized that with longer bouts of GT, one would experience greater perceived fatigue (PF) and a decrease in peak torque (PT) and work per repetition as a result of induced physiological effects of GT. The purpose of this study was to investigate the possible iatrogenic effect that GT could have on athletes when used prior to physical activity.

Methods: Ten Caucasian University of Wisconsin – Eau Claire Division III football players (age 20.50 ± .50) in the off-season volunteered as candidates for the single blind counter balanced study consisting of no treatment, treatment of 8 minutes, and treatment of 15 minutes. Results: Although analysis showed no significant relationship between GT treatment time to peak torque (p= .329), Work per repetition (p= .274), and PF (p= .453), there appears to be a trend developing between each variable. Peak torque and work per repetition seems to increase with longer bouts of GT, while PF increases at 8 minutes compared to baseline and declines at 15 minutes below baseline values. Conclusion: It is suggested that with longer GTs of BT prior to competition, an increase in peak torque and work per repetition may result. In addition, bouts of 15 minutes of GT may decrease perceived fatigue after physical exertion compared to receiving no treatment.

INTRODUCTION

GT is a soft tissue mobilization modality that is utilized to release scar tissue adhesions that exist between muscle tissue and the overlying fascia (Stow, 2011). Another use for this modality is to restart or initiate an inflammatory response within the tissue to assist in the healing process. This is done by increasing blood flow in the tissue by creating microtrauma within the muscle (Hall, 2009).

METHODS

Subjects
- 10 Male UW-Eau Claire Division III Football Players ages 20-21 years.
- Participants recruited via mass email as permission was granted by the head football coach for participation approval.
- Exclusion criteria: current participation in any sport, age less than 18 years, comorbidities, uncontrolled hypertension, hematoma, osteomyelitis, hemophilia, myositis ossificans and skin diseases. No subject warranted exclusion due to pathologies.
- All subjects were able to participate and informed consent was gathered according to IRB guidelines at UW-Eau Claire.

Table 1: Participant Characteristics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20.50</td>
<td>5.27</td>
</tr>
<tr>
<td>Height (in)</td>
<td>71.80</td>
<td>2.12</td>
</tr>
<tr>
<td>Weight (lbs)</td>
<td>222.60</td>
<td>54.40</td>
</tr>
<tr>
<td>Years of Participation</td>
<td>2.40</td>
<td>5.16</td>
</tr>
</tbody>
</table>

Instrumentation
- The HUMAC NORM isokinetic dynamometer was utilized to assess peak torque and work per repetition. According to McCleary and Anderson (1992), the Biodex isokinetic dynamometer was found to be a reliable instrument when assessing torque output in the quadriceps musculature. They found that there was an intraclass correlation value of .88-.97 for the Biodex (McCleary, 1992).
- This reliability carries over to the HUMAC NORM since it has the same mechanism as the Biodex by assessing quadriceps and hamstring force production (Potash & Potash, 2009).
- Visual Analog Scale (VAS) was an assessment tool to measure perceived pain (Bijur, Silver, Gallagher, 2008).
- A wall height chart and standard body weight scale was administered by a researcher who is qualified in implementing GT and its products on participating volunteers.

Testing Procedure
- Data was collected over a 3-week period from 6:30 pm to 8:30 pm. GT treatment was administered in the Athletic Training Treatment Center while Isokinetic testing was conducted in lab 198 of the McPhee Physical Education Building.
- Three participant groups were created via random number generator to create a counter balance study. Groups consisted of baseline where no treatment was administered (1), an 8 minute group (2) and 15 minute group (3). Each individual proceeded to the following group until all groups were completed.
- Isokinetic dynamometer was set to 60 deg/s on concentric-concentric for each test as it represents the greatest torque production.
- To ensure intra testing reliability, each researcher implemented individual tasks throughout the study. To reduce bias, a single blind study was conducted as the Isokinetic tester was unaware of the treatment time administered. In addition, the isokinetic dynamometer was calibrated prior to each testing day.
- Following 10 minutes of moderate physical activity on a stationary bicycle, GT emollient was applied by a researcher who is qualified in implementing GT and its products on participating volunteers.
- During 8 minutes of application, GT 4 was used to scan soft tissue for 1 minute to identify adhesions and fascial restriction, followed by 3 minutes of treatment. Once 4 minutes was met, GT 1 was applied for an additional 4 minutes.
- During the treatment of 15 minutes, GT 4 was applied for 1 minute to scan the soft tissue followed by 6 minutes. Once 7 minutes were completed, 8 minutes of GT 1 was applied for the remainder of the treatment.

SUMMARY AND CONCLUSIONS

- Although not significant, it is suspected that longer bouts of GT would benefit lower extremity performance due to the increase in peak torque and work per repetition. This may be the result of reduced scar tissue adhesions, that has a potential to increase performance as fascial restrictions on the muscle tissue is released.
- There was a non-significant decrease in VAS after 15 minutes of GT when compared to 8 minutes and baseline, suggesting the impact of gate control theory of pain. By inducing microtrauma to the muscle tissue, the treatment may desensitize the patient from pain. This is similar to other modalities such as electrical stimulation where the patient is no longer sensitive to the electrical current (Starkey, 1999).
- Further research should be conducted to investigate both the therapeutic and possible iatrogenic effects of Graston Technique that involves both males and females, larger sample sizes and different sport populations.

ACKNOWLEDGMENTS

We would like to thank Dr. Saori Braun for her guidance and assistance in making this a successful research project. We would also like to thank the Department of Kinesiology: Athletic Training Education Program for allowing us the use of the equipment needed for this study.

REFERENCES

- 8 Min
- 15 Minutes
- Table 2: F-Value P-Value Peak Torque
- Table 3: Peak Torque x Rep Mean Std. Deviation
- Table 4: Wk/Rep F-Value P-Value
- Table 5: VAS 15 Min
- Table 6: VAS 8 Min
- Table 7: VAS Baseline
- Table 8: VAS 15 Min
- Alpha level set at .05 to determine statistical significance.
- Data analyzed using IBM SPSS version 19.0.
- Descriptive analysis was used to determine the mean and standard deviation of baseline characteristics. This includes age, height, weight and years of Division III football participation.
- One-way repeated measures ANOVA and paired samples t-test were used to assess the significance of peak torque and work per repetition for both GT isokinetic tests and baseline isokinetic test. Same statistical analysis was conducted for VAS.