

Effects of Tissue Manipulation of Bilateral Quadriceps on Power Production and Vertical Height

ON COLLEGIATE DIVISION III FOOTBALL AND MALE BASKETBALL ATHLETES



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ABSTRACT

Purpose: The purpose of this study is to compare the power output and vertical height of football and basketball athletes through three different soft tissue manipulation techniques. We will accomplish this through the use of a Kistler Quattro Jump force plate. This study will help to further understand how these modalities affect athletes prior to sport activities. **Methods:** 30 male collegiate football and basketball athletes participated in the pretest-posttest randomized study, 16 football players and 14 basketball players. There will be 10 participants randomly assigned to each group: Graston, Dynamic Stretching, and a Foam Rolling group. Each participant will perform testing without soft tissue manipulation and then within 48-72 hours will test after treatment has been conducted. **Results:** After running the repeated measures Anova, the p-value was determined to not significant at .084 for power output and .072 for the vertical height changes. There were changes in the values of power and height as seen in the graphs. For power, DS went up while FR and GT both went down. For Vertical height DS was seen to increase the height of the jump while both FR and GT went down. **Conclusion:** Even though the different types of modalities had no significant change according to the p-value, there were still noticeable differences from pre to post test when looking at the average of all the variables. For both power output and vertical height, DS increased while FR and GT decreased for both. A possibility of a larger sample size could have had some effect on the significance of the results.

INTRODUCTION

Soft tissue manipulation (STM) can be described as a modality that is used to reduce muscle tension and spasms, reduce pain and enhance the range of motion of joints whose function depends on the involved muscles (Selkow et al., 2009). Currently, the effects of GT on power output, force production, and vertical jump is unknown.

PURPOSE AND HYPOTHESIS

If we perform Graston Technique, Foam Rolling, and Dynamic Stretching on college aged male athletes prior to having them perform a vertical jump test while on a Kessler force plate we will find that Graston is either more or less effective than Foam Rolling and Dynamic Stretching at increasing power output and vertical jump height.



METHODS

SUBJECTS

- 30 participants from the University of Wisconsin-Eau Claire and University of Wisconsin-Stout
- Recruited by email through coaches and players and also through various forms of social media
- Participants ranged from 18 to 23 years old
- The exclusion criteria: Having lifted lower body 3 days prior to doing both pretest and posttest and having had an acute lower body injury that kept them out of play for 6 months.
- All subjects were able to participate and informed consent was gathered according to IRB guidelines at University of Wisconsin-Eau Claire. The University of Wisconsin-Stout athletes were also aware of these guidelines and the Head Athletic Trainer signed consent with supervision.

INSTRUMENTATION

Jump Height and Power

- Kistler Quattro Jump type 9290AD. The Kistler Quattro force plate is created at Kistler Instrumente AG, which is located in Winterthur, Switzerland. It provides an objective measurement of power and jump height, along with other various measurements that did not pertain to this study. To collect data, the squat jump was utilized for testing purposes. The force plate measures the vertical jump, which is analyzed with the computer.
- In order to collect the subjects height and weight, Detecto's model 439 Eye Level Beam Physician Scale was utilized.
- Graston Technique/ Foam Roller
- Graston Technique instruments 4 and 5 were used to implement treatment after GT emollient was applied.

TESTING PROCEDURE

- Subjects were asked to come in two non-consecutive days, at the same time each day to perform their jumps
- For our research to be randomized, we used randomization.com to put people into three treatment groups and also randomize when people would receive the treatment before jumping or just warming up and then jumping.
- For the study to remain consistent across all participants and also produce valid results, we chose to do a five minute warm up on the stationary bike at a comfortable resistance. This was done prior to doing any type of treatment or jump and had to be done to insure a proper warm up.
- Immediately after completing warm up, participants performed one of the three treatment protocols.
- Subjects who were in the GT group received two and a half minutes of GT-4 and GT-5 on quadriceps muscle group bilaterally for a total of 10 minutes.
- Subjects who were in the FR group performed five minutes of FR bilaterally on each quadriceps muscle group, making sure to hold 15 seconds on a tender spot.
- Subjects in the DS group performed high knees and butt kicks the length of the basketball court, 20 lunges with a knee pull, 20 body weight squats, 20 second line jumps front to back and side to side, and ten reverse lunges.
- After completion of treatment, subjects jumped a total of three times within 3-5 minutes. The average of the three jumps was taken.
- At this point, the participants' information was entered into the software program used for the Quattro Jump. This step was completed fairly quickly as multiple participants could be entered and saved on the screen at one time.
- Again, the participants were told prior to completing the warm up if they were receiving treatment or just jumping right away.



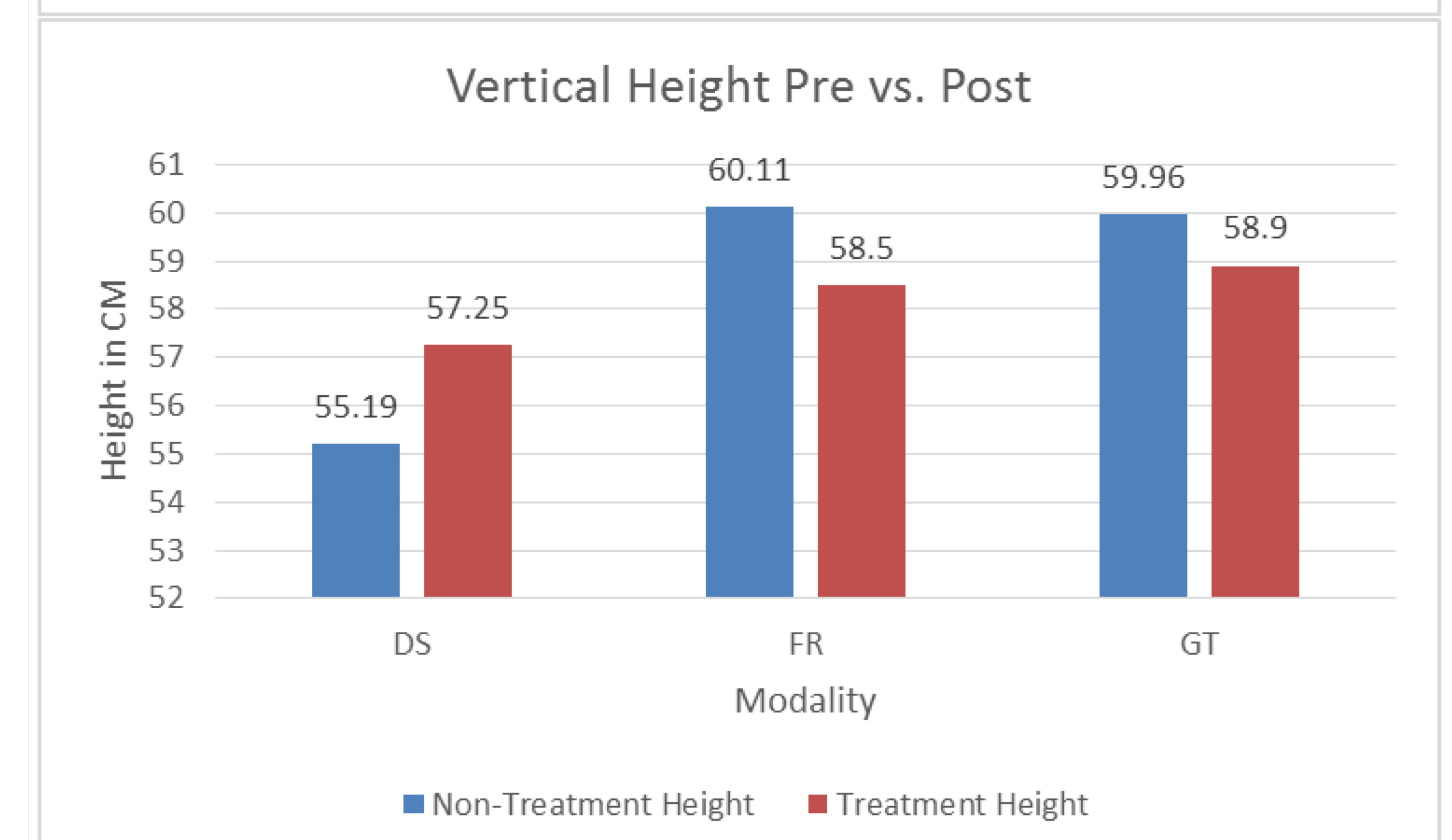
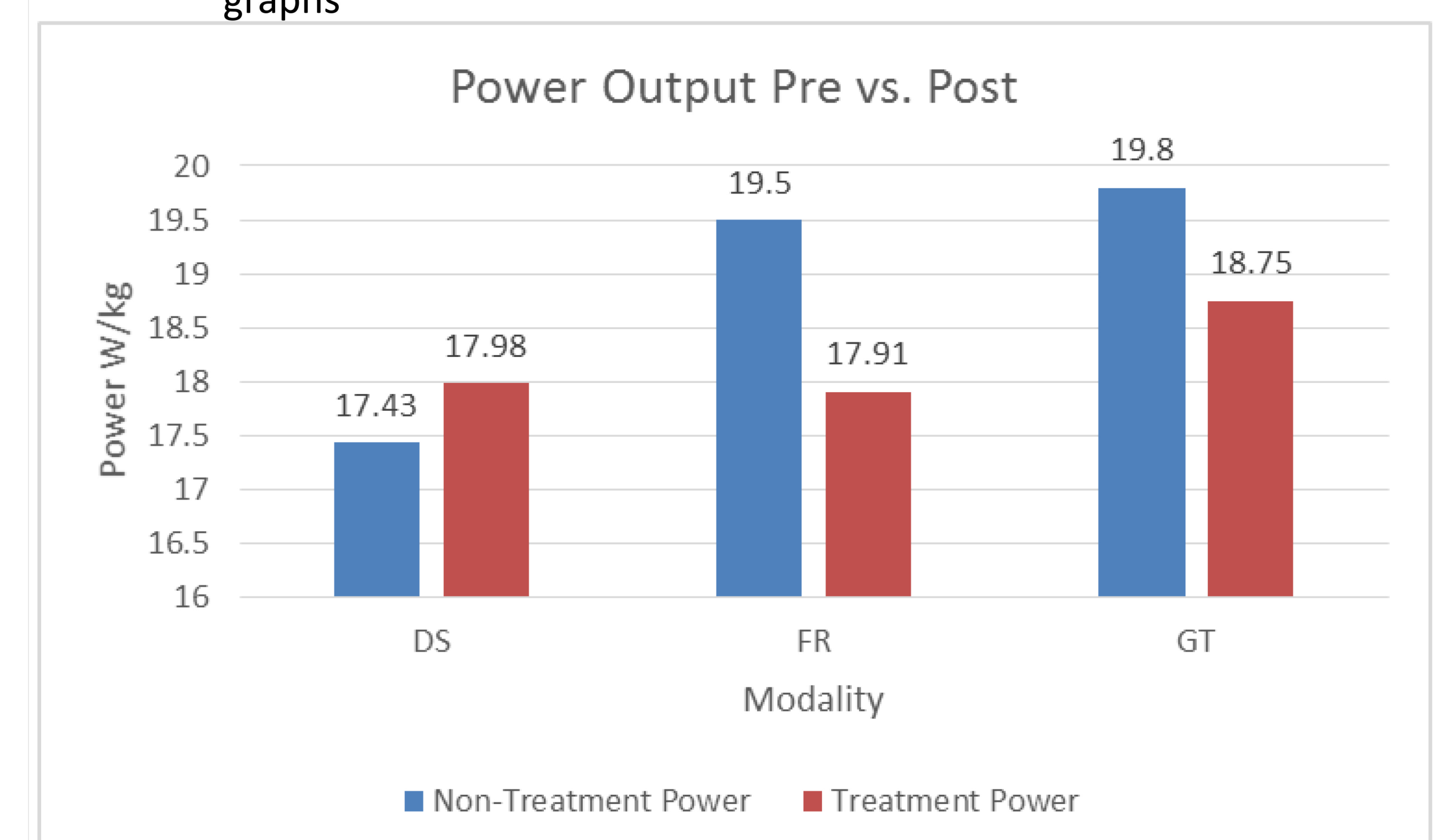
Kistler Quattro Jump 9290AD

STATISTICAL ANALYSIS

- Data analyzed using IBM SPSS version 19.0.
- Repeated Measures Anova was used to determine the significance and standard deviation
- Alpha level set at .05 to determine statistical significance

RESULTS

- The analysis showed no significant change from pre test to post test for all of the groups in both power output and vertical height changes with the p-value being .084 and .072
- There was however, a noticeable change in the amount of power and vertical height from pre to post test as seen in the graphs



CONCLUSION

- Although the p-value of .084 and .072 for power output and vertical height respectively does not show significance, there were changes in the values for both.
- Similar to the research that we had found, DS showed increases in power output and vertical jump. While FR showed decreases in both categories.
- Some alterations to this study that could be improved on would be including more participants to have a larger amount of data. Also having females included in this study could yield different results from the male participants.
- Having multiple treatments between pre test and post test may offer more of an insight into the effects of DS, FR, and GT on both power output and vertical height.

ACKNOWLEDGMENTS

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