The Effects of an Aquatics Protocol on Leg Muscle Strength in Active Population

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Abstract

Introduction: Little research exists on using an aquatics strength training protocol as a part of a workout protocol to aid in building lower body strength in an active population (Kaneda, 2008). Pool workouts may provide an alternative modality for increasing lower body strength in not only healthy populations, but may be of importance in the sports performance area as well. The purpose of the current research is to determine the effectiveness of an 8 session, 4 week, 5-exercise lower body aquatics protocol on leg muscle strength for an active student population using Myotest accelerometer and MicroFET dynamometer.
Methods: Seven (5 M, 2 F) healthy active students aged 19.5 yrs±1.5 SD were recruited for this study and randomly split into two workout groups. The 5-exercise protocol for the aquatics group (AP) used an underwater pool protocol and the dry-land group (DP) used a dry-land protocol. Prior to the first training session, and after 4-weeks of training protocols, participants were assessed for peak leg power tested via MicroFET dynamometer and Myotest 3D accelerometer. Data was collected for abductor, adductor and hip flexor muscles. The participants were randomly assigned to an exercise protocol which they performed twice a week for 4 weeks.
Results: Independent t-tests were performed between DP and AP groups shows no significance in posttest group differences for adductor right (AR) $\bar{x}$=9.63, SD=7.44, (p=.252), abductor right (AbR) $\bar{x}$=5.84, SD=4.54, (p=.255) and hip flexor right (HFR) $\bar{x}$=12.84, SD=9.79, (p=.247) strength. Myotest peak leg power scores for DP and AP groups squat jump (SJ) differences is $\bar{x}$=6.60, SD=4.91, (p=.296)
Conclusions: No statistical evidence was found between AP and DP groups power output in adductor, abductor and hip flexor strength. Results of the current study are likely due to a small sample size and a relatively short training program. Bocalini's research has displayed the effectiveness of water-based training protocols for lower body strength, flexibility and maintenance, (Bocalini, 2008) used a sample size of N=72, for a land and aquatics group using 60 minute exercise sessions, three

Figure 1.
Dry Land Protocol (DP)

	Duration
Band Abduction	3x10
Band Adduction	3x10
Hip Flexor Band Pull	3x10
Hip Flexor Pull Through	3x10
Lunges	3x10

Figure 1.
Aquatics Protocol (AP)

	Duration
Donkey Kicks	3x10
Forward Scissors	3x10
Knee Tuck	3x10
Leg Swings	3x10
Toe Touches	3x10

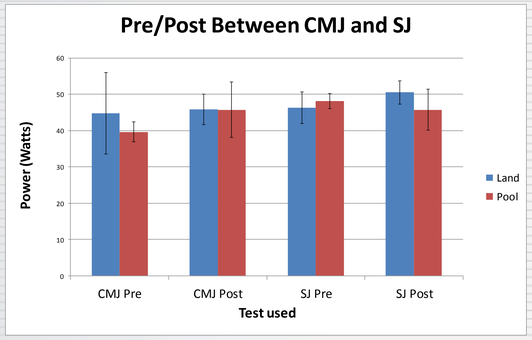
Methods

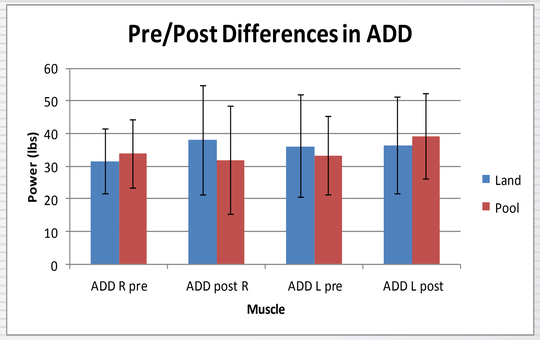
Seven (5 M, 2 F) healthy active students aged 19.5 yrs±1.5 SD were recruited for this study and randomly split into two workout groups. The 5-exercise protocol (figure 2 and figure 3) for the aquatics group (AP) used an underwater pool protocol and the dry-land group (DP) used a dry-land protocol. Prior to the first training session, and after 4-weeks of training protocols, participants were assessed for peak leg power tested via MicroFET dynamometer and Myotest 3D accelerometer. Data was collected for abductor, adductor and hip flexor muscles. The participants were randomly assigned to an exercise protocol which they performed twice a week for 4 weeks.

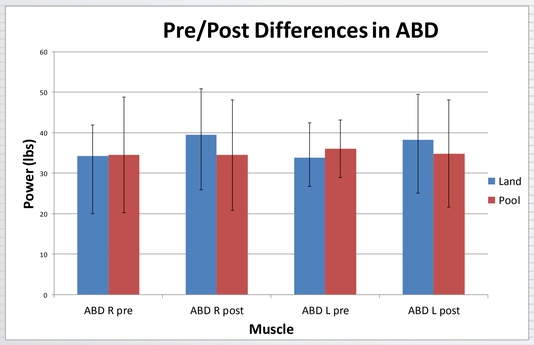
Once randomly assigned each training protocol, both groups completed either DP (figure 1) or AP (figure 2) of 5-exercises each twice a week for four connective weeks, for a total of 8 sessions.

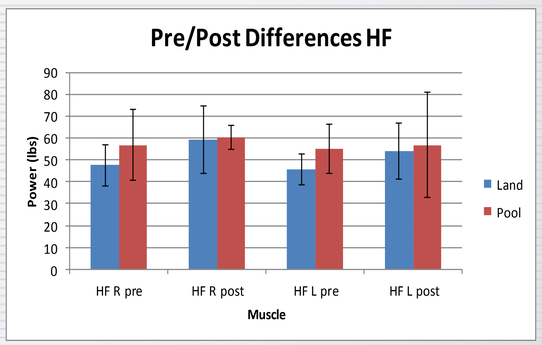
Introduction

Aquatic protocols are commonly used in the geriatric and rehabilitation populations[1,2,3,4]. In both of those populations, previous research has yielded positive results, as lower body strength increased in elderly population[1,2,3,4]. When evaluating before and after differences among three groups, water resistance improved isotonic leg extension strength and isometric leg extension strength with a percent difference of 5.5% isotonic and 14.6% isometric[1]. The previous research introducing an aquatics training protocol as a part of a workout routine to aid in building strength in an active population is limited in historical evidence. In the present study, investigators based protocols on previous research findings experienced in rehabilitation populations and applied them to Bethel University active young population. The goal of this research is to determine the effectiveness of an aquatics protocol in aiding in leg muscle strength for an active student population.



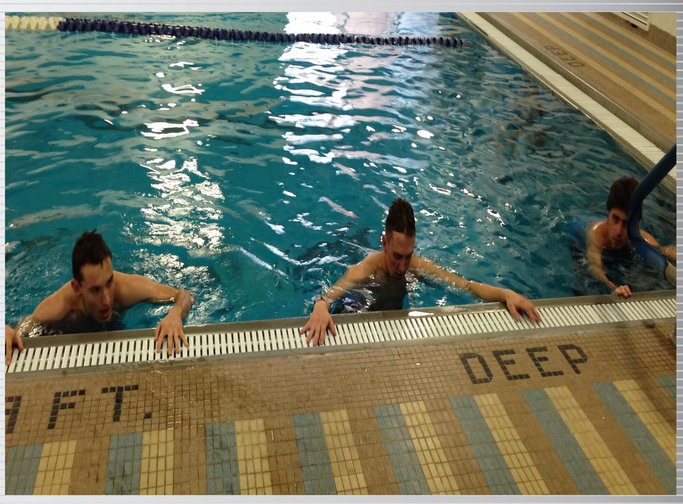






Results

Independent t-tests were performed between DP and AP groups shows no significance in posttest group differences for :
Power (W/kg). 3D accelerometer power information shows that there is no significant increase between AP and DP for SJ (p=.228) and CMJ (p=.371)
Adductor Strength Right Leg (lbs). Hand held dynamometer strength information shows there is no significant increase between AP and DP (p=.252)
Adductor Strength Left Leg (lbs). Hand held dynamometer strength information shows there is no significant increase between AP and DP (p=.170)
Abductor Strength Right Leg (lbs). Hand held dynamometer strength information shows there is no significant increase between AP and DP (p=.255)
Abductor Strength Left Leg (lbs). Hand held dynamometer strength information shows there is no significant increase between AP and DP (p=.309)
Hip Flexor Strength Right Leg (lbs). Hand held dynamometer strength information shows there is no significant increase between AP and DP (p=.247)
Hip Flexor Strength Left Leg (lbs). Hand held dynamometer strength information shows there is no significant increase between AP and DP (p=.636)



Conclusion

No statistical evidence was found between AP and DP groups output in adductor, abductor and hip flexor strength. Results of the current study are likely due to a small sample size and a relatively short training program. Previous research produced positive results when conducted with a larger sample size and longer training protocol. Bocalini's[2] research has displayed the effectiveness of water-based training protocols for lower body strength, flexibility and maintenance, (Bocalini, 2008) used a sample size of N=72, for a land and aquatics group using 60 minute exercise sessions, three times a week, over a 12 week span. We had time constraints for only training for 4-weeks but would consider and suggest a 12-week protocol and a greater population size.

References

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Acknowledgements

A special thank you to the YMCA of Shoreview for their pool space and all the subjects who were involved in the study.

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