The Effect of Swim Training on Speed, Agility and Power in Women Ice Hockey Players

Jenna Dean, Ariel McCullum, Chris Carroll, PhD, Seth Paradis, PhD

The Department of Human Kinetics and Applied Health Science
The Biokinetics Program

Abstract

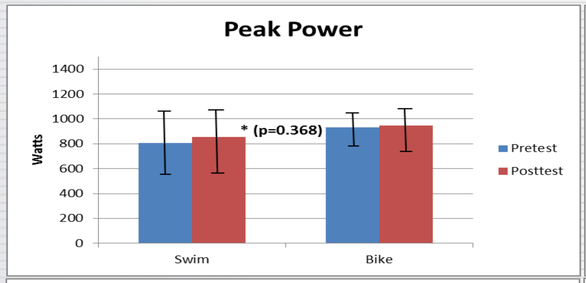
PURPOSE: The goal of this research is to examine the effect water exercise has on the development of speed, agility, and power in female hockey players. Water exercises are commonly used for the recovery and strengthening of muscles and joints after injury (Kaneda, 2008). Additionally, water exercise may be beneficial for developing speed, agility and power output.
METHODS: Data was collected from 9 women ice hockey players. Four subjects participated in the swimming protocol (experimental) and 5 participated in the biking protocol (control). Pre and post assessments were conducted on a Wingate cycle ergometer to assess peak power and percent fatigue. Agility was measured via an on-ice sprint protocol (30'-60'-30') and speed was assessed by measuring a sprint from the goal line to goal line (180 feet) and down and back times (360 feet).
RESULTS: Repeated independent t-tests were performed to determine significance ($p \leq 0.05$) between the control and experimental groups. No significance was found for peak power differences (p=.368), percent decrease differences (p=.265), agility differences (p=.262), and red line to red line speed (p=.286). Significance was found for down and back speed (p=.003).
CONCLUSION: No statistical significance was found between swim training and the power and agility variables. However, swim training did show significance in the down and back speed. This may demonstrate that the high/low intensity of the anaerobic swim training drills produced significance in speed, compared to the control group who trained at moderate intensity on a cycle ergometer. This study demonstrated that specificity of training is imperative for on-ice activities, however, as shown in past research, training in the pool could be significant for athletes in addition to their regular off-season training protocol (Tyler, 2001). Swim training may be valuable for the maintenance phase, post injury intervention, and rehabilitation (Beam, 1998).

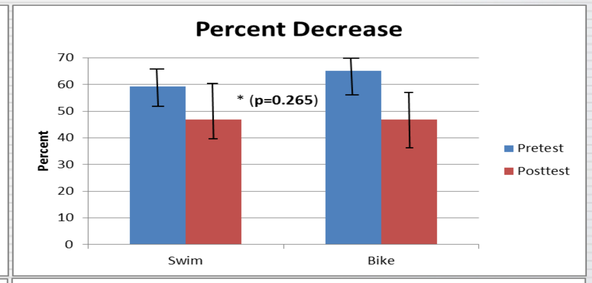
Methods

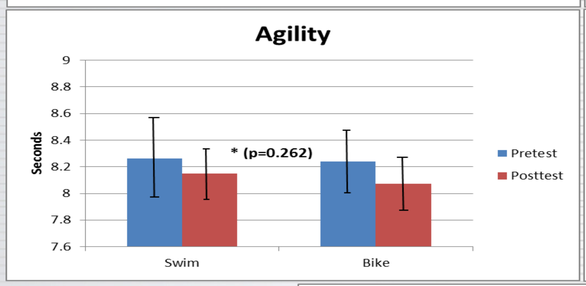
Nine healthy women ice hockey players from Bethel University participated in this study. Four were swimmers (experimental) and five participated in the biking portion (control). Ages ranged from 18-21. Athletes were tested for power via the Wingate anaerobic test performed on a cycle ergometer. Agility was tested via an on-ice sprint, a 30'-60'-30' agility skate. Speed was tested by a timed on-ice sprint, from goal line to goal line, down and back and also to the 1st goal line only.
The experimental group swam two days a week for four weeks at the Northwest Family YMCA pool in Shoreview, Minnesota to participate in a 30 minute aerobic and core targeted workout session. The control group biked with a self-selected resistance on the cycle for 30 min at 70 -85% of their max HR. They biked two times a week for four weeks. After the 4 week protocol, we performed a post-test, using the same three assessments and throughout the season. Independent t-tests were performed between the experimental and control groups to find significance ($p<0.05$).

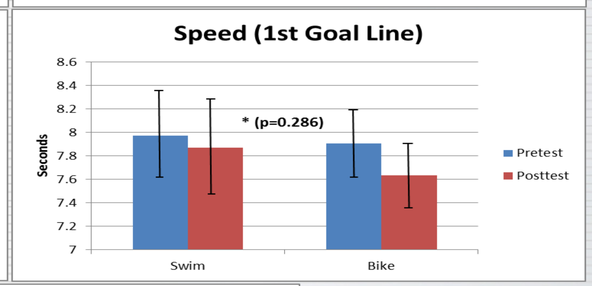
Introduction

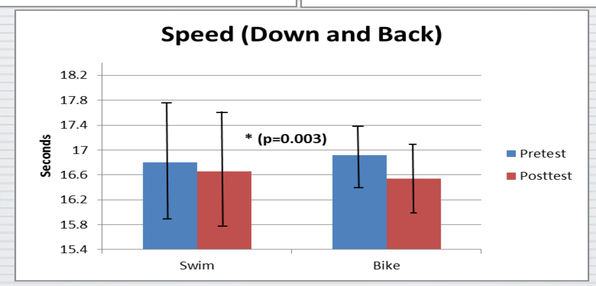
In a majority of preseason ice hockey programs, dry-land training is a key component; swimming is either a small portion of ice hockey training or not mentioned at all. Water exercises are commonly used for the recovery and strengthening of muscles and joints (Kaneda, 2008). To best of the researchers' knowledge, no research has been done to show if swim training could be beneficial for the development of speed, agility and power output on the ice. Water resistance may add a component to strength training that other dry land training programs do not provide. Swim training may add to these strength programs so that it could potentially be even more beneficial to an ice hockey player.











Results

Peak Power (W). According to the Cycle Ergometer Peak Power information, 7 of the 9 subjects did improve from the pre to post testing. Average increase of all participants was 33 W. (p=0.368)
Percent Decrease (%). According to the Cycle Ergometer Percent Decrease information, all 9 subjects improved their percent decrease. Average decrease of all participants was -15.78%. (p=0.265)
Agility, 25-50-25. The results of the on-ice agility test showed that 7 of the 9 participants did improve their time slightly. Average decrease of time of all participants was -0.14 seconds. (p=0.262)
Speed, 1st goal line. The results of the on-ice speed (1st goal line) test showed that 6 of the 8 participants in this event did improve their time slightly. Average decrease of time of all participants was -0.18 seconds. (p=0.286)
Speed total, down and back. The results of the on-ice speed (down and back time) test showed that 7 of the 9 participants did improve their time slightly. Average decrease of time of all participants was -0.28 seconds. (p=0.003)

Conclusion

This study shows that training specificity is important for on-ice activities. No statistical significance was found between swim training and the power, agility variables, and speed (1st goal line) (p=0.368, 0.265, 0.262, 0.286). However, swim training did show significance in the down and back speed (p=0.003). This shows that the high/low intensity of the anaerobic swim training drills produced significance in speed, as opposed to the control group who trained at moderate intensity on a cycle ergometer. This research shows that training in the pool could be significant for athletes in addition to their regular off-season training protocol (Tyler, 2001), however, there should be more specific, on-ice activities as well. In the end, swim training may be more valuable for the maintenance phase, post injury intervention, and rehabilitation (Beam, 1998).

References

Emery CA, Meeuwisse WH, & Powell JW. (1999). Groin and abdominal strain injuries in the national hockey league. *Clinical Journal of Sport Medicine : Official Journal of the Canadian Academy of Sport Medicine, 9*(3), 151-6.
J.W., B. (1998). Athletic training for groin pain. *Journal of Bodywork and Movement Therapies, 2*(3), 144-148. doi: 10.1016/S1360-8592(98)80005-3
Kaneda, K., Wakabayashi, H., Sato, D., Uekusa, T., & Nomura, T. (2008). Lower extremity muscle activity during deep-water running on self-determined pace. *Journal of Electromyography and Kinesiology, 18*(6), 965-972. doi: 10.1016/j.jelekin.2007.04.004
Kuster, M. S. (2002). Exercise recommendations after total joint replacement: A review of the current literature and proposal of scientifically based guidelines. *Sports Medicine, 32*(7), 433-445.
Maffey, L., & Emery, C. (2008). What are the risk factors for groin strain injury in sport?: A systematic review of the literature. *Sports Medicine, 37*(10), 881-894.
Tyler, T. F., Nicholas, S. J., Campbell, R. J., Donellan, S., & McHugh, M. P. (2002). The effectiveness of a preseason exercise program to prevent adductor muscle strains in professional ice hockey players. *The American Journal of Sports Medicine, 30*(5), 680-683.

Special Acknowledgments

A special thank you to the Bethel Women's Ice Hockey team for committing their time and cooperation in participating in this study. A very special thank you to the Northwest Family YMCA in Shoreview for donating pool hours and being flexible with our time requirements.

Jenna Dean: jvd49724@bethel.edu ▪ Ariel McCullum: akm37775@bethel.edu ▪ Chris Carroll: carchrk@bethel.edu ▪ Seth Paradis: s-paradis@bethel.edu